CBX32M (R410A) SERIES UNIT

CBX32M are high efficiency blower coils designed for R410A applications only. Several models are available in sizes ranging from 1-1/2 through 5 tons (5.3 through 17.6 kW). The CBX32M units are multi-position (upflow, downflow or horizontal). The units come with a factory installed check and expansion valve for cooling or heat pump applications.

CBX32M series units are designed to be matched with the 12 and 13 SEER air conditioner and heat pump lines. While these blower coil units are designed to be primarily matched with these outdoor units, they may be matched with other air conditioners or heat pumps as noted in the rating information.

ECB29 electric heat, in several voltages and kW sizes, can be field installed in the CBX32M cabinets.

Information contained in this manual is intended for use by qualified HVAC service technicians only. All specifications are subject to change. Procedures outlined in this manual are presented as a recommendation only and do not supersede or replace local or state codes.

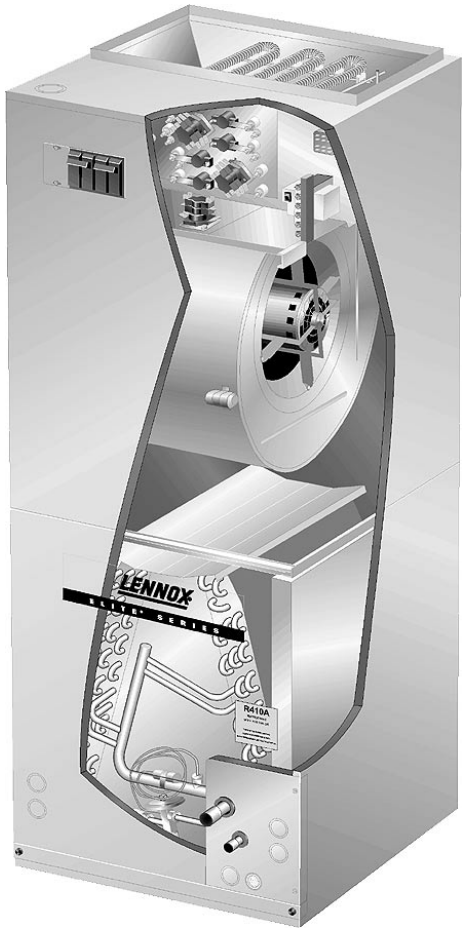


Table of Contents

General 1
Specifications 2
Blower Data 3
Parts Arrangement 4
I Application 5
II Unit Components 5
Electric Heat Data 7
III Electric Heat Components 12
IV Configuration Modifications 15
V Start Up Operation 18
VI Typical Operating Characteristics 19
VII Maintenance 19
VIII Wiring Diagrams and Operating Sequence 20

⚠ IMPORTANT

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a qualified installer or service agency.

⚠ WARNING

Electric shock hazard. Can cause injury or death. Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch(es). Unit may have multiple power supplies.

© 2002 Lennox Industries Inc.
Litho U.S.A.

SPECIFICATIONS

General Data	Model Number	CBX32M-018/024	CBX32M-030	CBX32M-036
	Nominal Tonnage (kW)	1.5 - 2 (5.3 - 7)	2.5 (8.8)	3 (10.6)
	Refrigerant	R-410A	R-410A	R-410A
Connections	Suction (vapor) line - in. (mm) sweat	5/8 (16)	3/4 (19)	3/4 (19)
	Liquid line - in. (mm) sweat	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Condensate drain (fpt) - in. (mm)	(2) 3/4 (19)	(2) 3/4 (19)	(2) 3/4 (19)
Evaporator Coil	Net face area - ft.^{2} (m^2)	3.56 (0.33)	4.44 (0.41)	5.0 (0.46)
	Tube outside diameter - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Number of rows	3	3	3
	Fins per inch (fins per m)	12 (472)	12 (472)	12 (472)
Blower Data	Wheel nominal diameter x width - in.	10 x 7	10 x 8	11 x 8
	mm	254 x 178	254 x 203	279 x 203
	Blower motor output - hp (W)	1/5 (149)	1/3 (249)	1/3 (249)
Filters	‡Number and size - in.	(1) 15 x 20 x 1	(1) 20 x 20 x 1	(1) 20 x 20 x 1
	mm	(1) 381 x 508 x 25	(1) 508 x 508 x 25	(1) 508 x 508 x 25
Electrical characteristics (60hz)		208/230v-1ph	208/230v-1ph	208/230v-1ph
Shipping Data - 1 Package		136 lbs. (62 kg)	157 lbs. (71 kg)	177 lbs. (80 kg)
Optional Accessories - Must Be Ordered Extra				
CCB1 EfficiencyPlus™ Humidity Control		**35H00**	**35H00**	**35H00**
Down-Flow Combustible Base	Shipping weight - lbs. (kg)	**34J72** - 8 (4)	**34J73** - 8 (4)	**34J73** - 8 (4)
EBR1 Blower Relay Kit (for CCB1)		**75H90**	**75H90**	**75H90**
Electric Heat		2.5 to 20 kW - See Electric Heat Data tables		
Side Return Unit Stand (Up-Flow Only)	Shipping weight - lbs. (kg)	**45K31** - 5 (2)	**45K32** - 6 (3)	**45K32** - 6 (3)
Single-Point Power Source Control Box	Shipping weight - lbs. (kg)	**21H39** - 5 (2)	**21H39** - 5 (2)	**21H39** - 5 (2)
Wall Hanging Bracket Kit (Up-Flow Only)	Shipping weight - lbs. (kg)	**45K30** - 3 (1)	**45K30** - 3 (1)	**45K30** - 3 (1)

‡Disposable frame type filter.

General Data	Model Number	CBX32M-042	CBX32M-048	CBX32M-060
	Nominal Tonnage (kW)	3.5 (12.3)	4 (14.1)	5 (17.6)
	Refrigerant	R-410A	R-410A	R-410A
Connections	Suction (vapor) line - in. (mm) sweat	7/8 (22.2)	7/8 (22.2)	1-1/8 (28)
	Liquid line - in. (mm) sweat	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Condensate drain (fpt) - in. (mm)	(2) 3/4 (19)	(2) 3/4 (19)	(2) 3/4 (19)
Evaporator Coil	Net face area - ft.^{2} (m^2)	5.0 (0.46)	7.22 (0.67)	7.22 (0.67)
	Tube outside diameter - in. (mm)	3/8 (9.5)	3/8 (9.5)	3/8 (9.5)
	Number of rows	3	3	3
	Fins per inch (fins per m)	12 (472)	12 (472)	12 (472)
Blower Data	Wheel nominal diameter x width - in.	11 x 8	11-1/2 x 9	12 x 9
	mm	279 x 203	292 x 229	305 x 229
	Blower motor output - hp (W)	1/3 (249)	1/3 (249)	1/2 (373)
Filters	‡Number and size - in.	(1) 20 x 20 x 1	(1) 20 x 24 x 1	(1) 20 x 24 x 1
	mm	(1) 508 x 508 x 25	(1) 508 x 610 x 25	(1) 508 x 610 x 25
Electrical characteristics (60hz)		208/230v-1ph	208/230v - 1 ph	208/230v - 1 ph
Shipping Data - 1 Package		181 lbs. (82 kg)	206 lbs. (93 kg)	206 lbs. (93 kg)
Optional Accessories - Must Be Ordered Extra				
CCB1 EfficiencyPlus™ Humidity Control		**35H00**	**35H00**	**35H00**
Down-Flow Combustible Base	Shipping weight - lbs. (kg)	**34J73** - 8 (4)	**34J73** - 8 (4)	**34J73** - 8 (4)
EBR1 Blower Relay Kit (for CCB1)		**75H90**	**75H90**	**75H90**
Electric Heat		5 to 30 kW - See Electric Heat Data tables		
Side Return Unit Stand (Up-Flow Only)	Shipping weight - lbs. (kg)	**45K32** - 6 (3)	**45K32** - 6 (3)	**45K32** - 6 (3)
Single-Point Power Source Control Box	Shipping weight - lbs. (kg)	**21H39** - 5 (2)	**21H39** - 5 (2)	**21H39** - 5 (2)
Wall Hanging Bracket Kit (Up-Flow Only)	Shipping weight - lbs. (kg)	**45K30** - 3 (1)	**45K30** - 3 (1)	**45K30** - 3 (1)

‡Disposable frame type filter.

Optional CIRCUIT BREAKER KITS - Must Be Ordered Extra							
Amperage	25	30	35	40	45	50	60
Single Phase	**23M58**	**23M59**	**23M60**	**23M61**	**23M62**	**23M63**	**23M64**
Three Phase	- - -	**23M65**	- - -	**23M66**	**23M67**	**23M68**	**23M69**

BLOWER DATA

CBX32M-018/024 BLOWER PERFORMANCE (208/230v)

External Static Pressure		Air Volume and Motor Watts at Specific Blower Taps								
		High			Medium			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
.00	0	1030	485	365	895	425	300	700	330	245
.05	10	1015	480	360	890	420	295	695	330	245
.10	25	1000	470	355	875	415	290	690	325	240
.15	35	980	465	345	860	405	285	680	320	235
.20	50	960	455	340	845	400	280	665	315	230
.25	60	935	440	335	825	390	275	650	310	220
.30	75	910	430	325	800	380	265	635	300	215
.40	100	850	400	310	745	355	250	590	280	205
.50	125	780	370	295	685	320	235	535	255	190
.60	150	705	330	280	605	285	220	470	220	175
.70	175	615	290	265	520	245	200	395	185	165
.75	185	565	265	255	475	225	195	350	165	155

NOTE - All air data is measured external to unit with air filter in place with bottom return air. Electric heaters have no appreciable air resistance.

CBX32M-030 BLOWER PERFORMANCE (208/230v)

External Static Pressure		Air Volume and Motor Watts at Specific Blower Taps								
		High			Medium			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
.00	0	1290	610	385	1175	555	335	1045	490	315
.05	10	1295	610	380	1190	560	330	1075	505	310
.10	25	1290	610	375	1190	560	325	1085	515	300
.15	35	1265	600	370	1175	555	320	1085	510	295
.20	50	1230	580	360	1145	540	310	1065	505	285
.25	60	1180	555	350	1105	520	295	1030	485	270
.30	75	1115	525	335	1045	495	280	980	460	255
.40	100	945	445	305	890	420	250	830	390	220
.50	125	720	340	275	675	320	215	615	290	190
.60	150	440	205	240	405	190	185	335	155	160

CBX32M-036 BLOWER PERFORMANCE (208/230v)

External Static Pressure		Air Volume and Motor Watts at Specific Blower Taps								
		High			Medium			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
.00	0	1525	720	505	1120	530	390	915	430	335
.05	10	1520	720	495	1150	540	385	965	455	330
.10	25	1510	715	480	1170	550	380	1005	475	325
.15	35	1495	705	470	1180	560	375	1035	490	320
.20	50	1475	695	455	1190	560	370	1055	495	320
.25	60	1450	685	440	1185	560	360	1060	500	310
.30	75	1415	670	430	1175	555	350	1050	495	300
.40	100	1335	630	400	1135	535	325	1005	475	290
.50	125	1230	580	375	1060	500	300	915	430	255
.60	150	1100	520	345	960	455	280	775	365	230
.70	175	950	450	320	830	390	255	590	280	205
.75	185	870	410	305	750	355	245	485	230	195

NOTE - All air data is measured external to unit with air filter in place with bottom return air. Electric heaters have no appreciable air resistance.

CBX32M-042 BLOWER PERFORMANCE (208/230v)

External Static Pressure		Air Volume and Motor Watts at Specific Blower Taps								
		High			Medium			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
.00	0	1825	860	565	1600	755	455	1325	625	370
.05	10	1790	845	555	1585	750	455	1335	630	370
.10	25	1750	825	540	1565	740	450	1335	630	370
.15	35	1710	805	530	1540	725	440	1330	630	365
.20	50	1660	785	520	1505	710	435	1320	620	360
.25	60	1610	760	505	1470	695	425	1300	615	355
.30	75	1555	735	495	1425	675	415	1270	600	350
.40	100	1430	675	465	1320	625	390	1195	565	330
.50	125	1290	610	440	1195	565	365	1090	515	310
.60	150	1135	535	415	1050	495	335	955	450	285
.70	175	965	455	385	875	415	310	795	375	260
.75	185	875	415	370	780	370	295	700	330	250

CBX32M-048 BLOWER PERFORMANCE (208/230v)

External Static Pressure		Air Volume and Motor Watts at Specific Blower Taps								
		High			Medium			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
.00	0	1910	900	590	1785	845	520	1475	695	430
.05	10	1895	895	585	1770	835	515	1480	700	430
.10	25	1870	880	580	1750	825	510	1475	695	425
.15	35	1840	865	570	1720	810	500	1465	690	420
.20	50	1800	850	565	1685	795	490	1445	680	410
.25	60	1755	830	550	1645	775	480	1415	670	405
.30	75	1700	805	540	1600	755	465	1380	650	395
.40	100	1580	745	515	1485	700	440	1290	610	370
.50	125	1425	675	485	1350	635	410	1170	550	345
.60	150	1250	590	450	1190	560	380	1020	480	320
.70	175	1045	495	415	1000	470	350	840	395	295
.75	185	930	440	400	900	425	335	740	350	280

NOTE - All air data is measured external to unit with air filter in place with bottom return air. Electric heaters have no appreciable air resistance.

CBX32M-060 BLOWER PERFORMANCE (208/230v)

External Static Pressure		Air Volume and Motor Watts at Specific Blower Taps								
		High			Medium			Low		
in. w.g.	Pa	cfm	L/s	Watts	cfm	L/s	Watts	cfm	L/s	Watts
.00	0	2115	995	780	2025	955	670	1775	835	585
.05	10	2100	990	770	2010	950	665	1775	835	590
.10	25	2085	985	765	1995	940	655	1770	835	580
.15	35	2060	970	750	1975	930	645	1760	830	570
.20	50	2030	960	740	1950	920	635	1745	825	560
.25	60	2000	945	730	1915	905	625	1725	815	550
.30	75	1960	925	715	1880	885	610	1695	800	535
.40	100	1870	880	685	1795	845	580	1630	770	505
.50	125	1755	830	655	1690	795	545	1540	725	475
.60	150	1620	765	625	1560	735	515	1425	675	440
.70	175	1465	690	590	1415	670	480	1295	610	410
.80	200	1290	610	560	1250	590	445	1140	535	375
.85	210	1195	565	545	1160	550	425	1050	495	360

CBX32M PARTS ARRANGEMENT

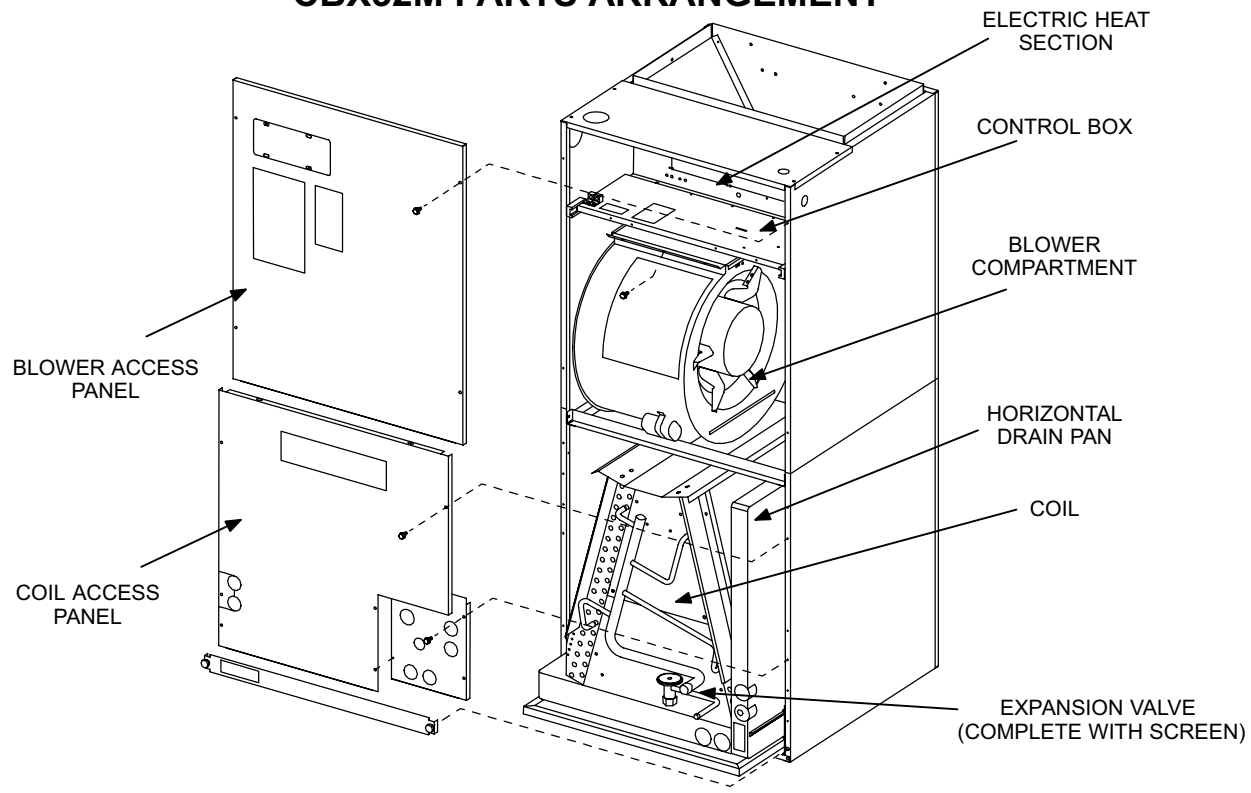


FIGURE 1

CBX32M CONTROL BOX

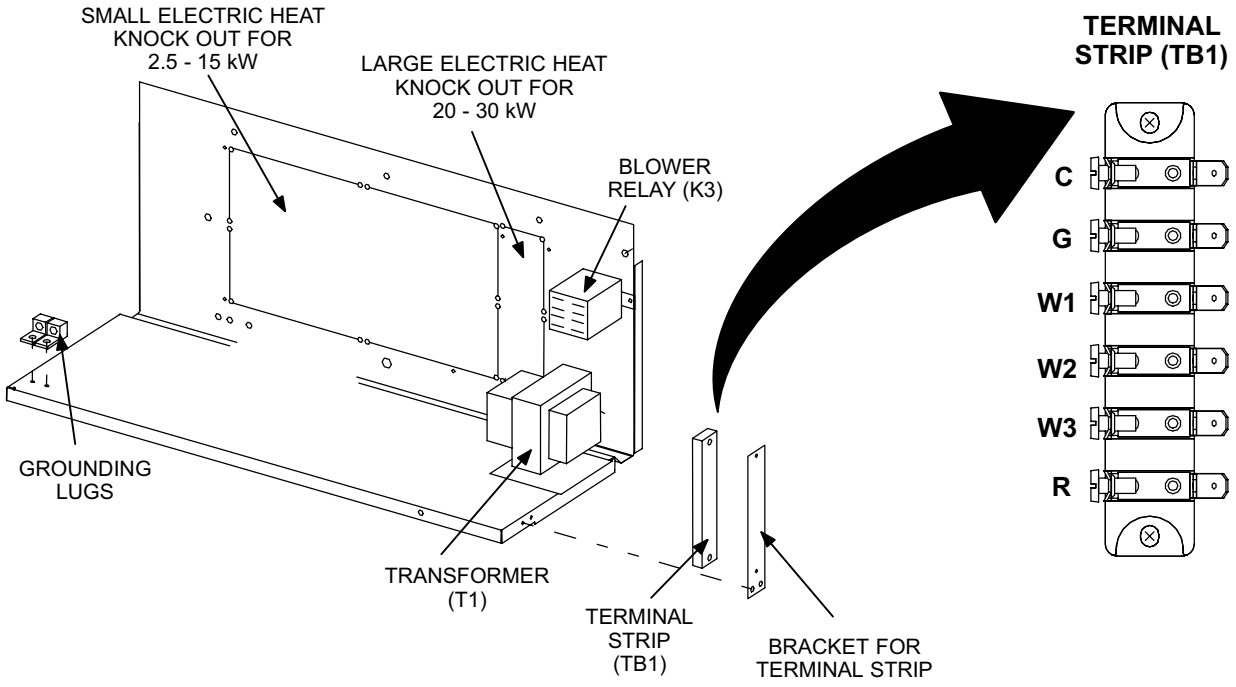


FIGURE 2

I-APPLICATION

CBX32M blower coils are designed for R410A applications only. All major blower coil components must be matched according to Lennox recommendations for the unit to be covered under warranty. Refer to the Engineering Handbook for approved system matchups. A misapplied system will cause erratic operation and can result in early unit failure. The units come with factory installed check and expansion valve for all applications. The TXV valve has been installed internally for a cleaner installation and is accessible if required.

ELECTROSTATIC DISCHARGE (ESD)
Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during unit installation and service to protect the unit's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the unit, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface before performing any service procedure.

II-UNIT COMPONENTS

A-Control Box

The CBX32M control box is shown in figure 2. Line voltage and electric heat connections are made in the control box. Optional electric heat fits through an opening located in the center of the control box. When electric heat is not used, knock out plates cover the opening. The electric heat control arrangement is detailed in the electric heat section of this manual.

B-Terminal Strip (TB1)

CBX32M units are equipped with a low voltage terminal strip (TB1) located in the control box. See figure 2. The strip is used for making up all indoor thermostat wires. The outdoor unit low voltage wiring connections may be spliced with wire nuts inside the CB units.

C-Transformer (T1)

CBX32M series units use a single line voltage to 24VAC transformer mounted in the control box. The transformer supplies power to the control circuits in the indoor and outdoor unit. Transformers on all CBX32M-1 units are rated at 70VA. Transfomers on CBX32M-018 through -042-2 units are rated at 70VA and CBX32M-048, -060-2 units are rated at 40VA. 208/240VAC single phase transformers use two primary voltage taps as shown in figure 3.

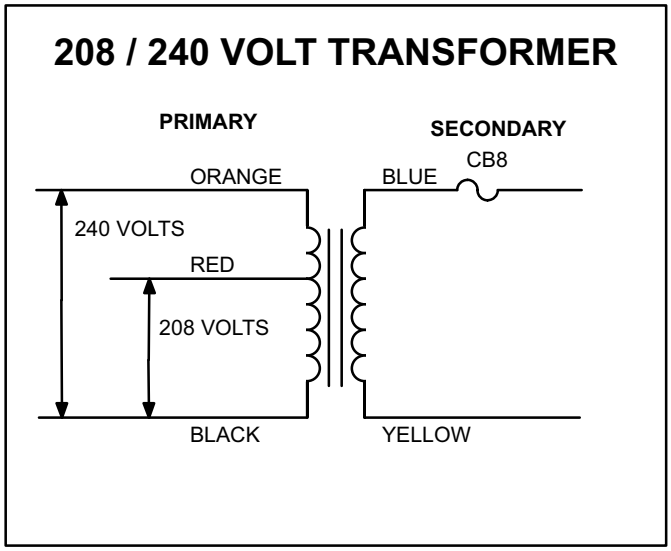


FIGURE 3

D-Circuit Breaker (CB8) -1 units

All transformers used in the CBX32M-1 series units are equipped with internal secondary voltage overcurrent protection. Each transformer uses a circuit breaker (CB8) located on the transformer. The circuit breaker is connected in series with the blue secondary voltage wire and is rated 3.5 Amps.

E-Transformer Fuse (F1) -2 units

The transfomer in all CBX32M-2 units is protected by an in-line fuse (F1). The fuse is rated at 32 volts and 3 amps.

F-Blower Relay (K3)

CBX32M units use a DPDT relay to energize the blower motor. The relay coil is energized by blower demand from indoor thermostat. When the coil is energized, a set of N.O. contacts closes to energize the blower motor on cooling speed. When de-energized, a set of N.C. contacts allows the optional electric heat relay to energize the blower on heating speed (refer to unit wiring diagram).

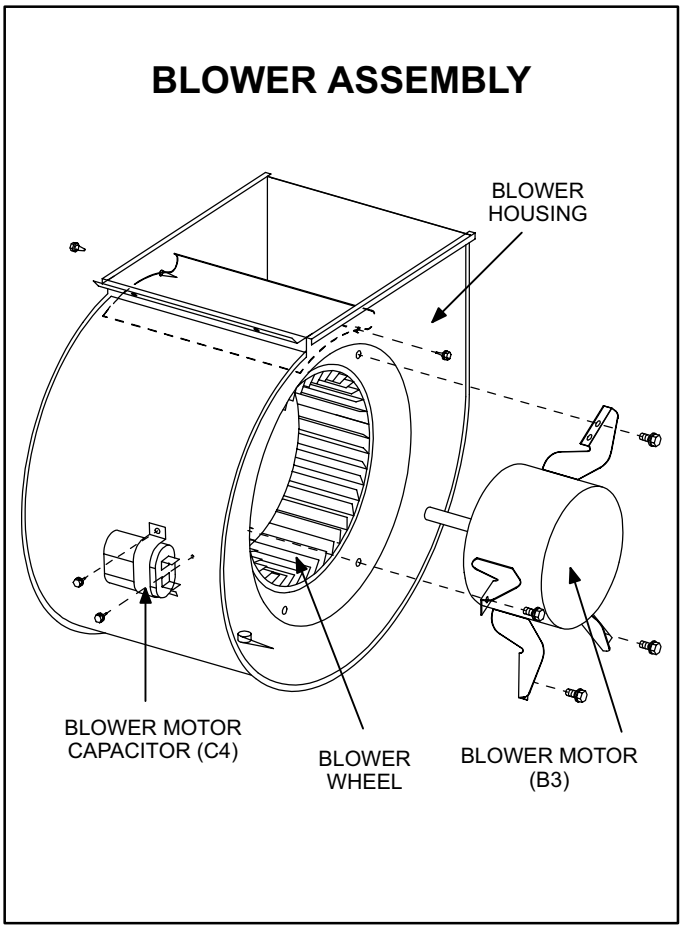


FIGURE 4

G-Blower Motor (B3)

CBX32M units use single phase direct drive blower motors with a run capacitor. Figure 4 shows the parts arrangement. All motors use multiple speed taps. Typically, the high speed tap is energized during normal operation. The horse power for each blower motor is listed in table 1.

All units are factory wired for the minimum blower speed for heat pump and cooling applications with or without electric heat. No field wiring is required. The wiring diagrams show factory set blower speeds. To run the blower on high speed, refer to the installation instructions. All speeds shown are minimums. Do not change motor taps to operate at speeds lower than those shown in the tables.

H-Blower Motor Capacitor (C4)

CBX32M series units use single phase direct drive motors with a run capacitor. The run capacitor is mounted on the blower housing. See figure 4. Capacitor ratings are shown in table 1.

TABLE 1

CBX32M BLOWER RATINGS		
UNIT	HORSE POWER	CAPACITOR RATING
-018/024	1/5 HP	7.5MFD / 370V
-030	1/3 HP	15MFD / 370V
-036	1/3 HP	15MFD / 370V
-042	1/3HP	20MFD / 370V
-048	1/3HP	20MFD / 370V
-060	1/2HP	20MFD / 370V

I-Coil

CBX32M series units have dual slab coils arranged in an “A” configuration. Each coil has two or three rows of copper tubes fitted with ripple-edged aluminum fins. An expansion valve complete with screen, feeds multiple parallel circuits through the coils. The coil is designed to easily slide out of the unit cabinet.

J-Plastic Drain Pans

Both upflow/downflow and horizontal drain pans are provided and installed on CBX32M units. The drain pans are made from fiberglass filled plastic. The drain hole on horizontal pans are used for right-hand discharge only, and must be plugged when the unit is configured for left-hand discharge.

TABLE 2

CBX32M-018/024 AND CBX32M-030 - ELECTRIC HEAT DATA

SINGLE PHASE ELECTRIC HEAT						CBX32M-018/024			CBX32M-030				
				Input		Blower Motor Full Load Amps	[3]Minimum Circuit Ampacity	Maximum Fuse Size	Blower Motor Full Load Amps	[3]Minimum Circuit Ampacity		Maximum Fuse Size	
	Model Number	No. of Steps	Volts	kW	[1]Btuh					Circuit 1	Circuit 2	Circuit 1	Circuit 2
2.5 kW 4 lbs.	ECB29-2.5 **(28K30)**	1	208	1.9	6,400	1.5	13	15	Not Available				
			220	2.1	7,200	1.5	15	15					
			230	2.3	7,800	1.5	15	15					
			240	2.5	8,500	1.5	15	15					
5 kW 4 lbs.	ECB29-5 **(28K31)** Terminal Block ECB29-5CB **(28K32)** 30A Circuit breaker	1	208	3.8	12,800	1.5	24	[4]**25**	1.73	25	- - -	[4]**25**	- - -
			220	4.2	14,300	1.5	28	30	1.73	28	- - -	30	- - -
			230	4.6	15,700	1.5	28	30	1.73	28	- - -	30	- - -
			240	5.0	17,100	1.5	28	30	1.73	28	- - -	30	- - -
6 kW 4 lbs.	ECB29-6 **(47L22)** Terminal Block ECB29-6CB **(47L23)** 35A Circuit breaker	1	208	4.5	15,400	1.5	29	[4]**30**	1.73	30	- - -	[4]**30**	- - -
			220	5.0	17,100	1.5	33	35	1.73	33	- - -	35	- - -
			230	5.5	18,800	1.5	33	35	1.73	33	- - -	35	- - -
			240	6.0	20,500	1.5	33	35	1.73	33	- - -	35	- - -
8 kW 5 lbs.	ECB29-8 **(28K33)** Terminal Block ECB29-8CB **(28K34)** 45A Circuit breaker	2	208	6.0	20,500	1.5	38	[4]**40**	1.73	38	- - -	[4]**40**	- - -
			220	6.7	22,900	1.5	44	45	1.73	44	- - -	45	- - -
			230	7.3	25,100	1.5	44	45	1.73	44	- - -	45	- - -
			240	8.0	27,300	1.5	44	45	1.73	44	- - -	45	- - -
9 kW 5 lbs.	ECB29-9CB **(10L11)** 50A Circuit breaker ECB29EH-9CB **(91K68)** 50A Circuit breaker	2	208	6.8	23,100	1.5	42	[4]**45**	1.73	43	- - -	[4]**45**	- - -
			220	7.6	25,800	1.5	49	50	1.73	49	- - -	50	- - -
			230	8.3	28,200	1.5	49	50	1.73	49	- - -	50	- - -
			240	9.0	30,700	1.5	49	50	1.73	49	- - -	50	- - -
10 kW 6 lbs.	ECB29-10 **(28K35)** Terminal Block ECB29-10CB **(28K36)** 60A Circuit breaker	2	208	7.5	25,600	1.5	47	[4]**50**	1.73	47	- - -	[4]**50**	- - -
			220	8.4	28,700	1.5	54	60	1.73	54	- - -	60	- - -
			230	9.2	31,400	1.5	54	60	1.73	54	- - -	60	- - -
			240	10.0	34,100	1.5	54	60	1.73	54	- - -	60	- - -
12.5 kW 10 lbs.	ECB29-12.5CB **(28K37)** (1) 25A & (1) 50A Circuit breaker ECB29EH-12.5CB **(91K68)** (1) 25A & (1) 50A Circuit breaker	3	208	7.5	25,600	Not Available			1.73	21	31	25	[4]**45**
			220	8.4	28,700				1.73	24	35	25	50
			230	9.2	31,400				1.73	24	35	25	50
			240	10.0	34,100				1.73	24	35	25	50
15 kW 12 lbs.	ECB29-15CB **(28K38)** (1) 30A & (1) 60A Circuit breaker ECB29EH-15CB (**91K69**) (1) 30A & (1) 60A Circuit breaker	3	208	11.3	38,400	Not Available			1.73	24	37	[4]**25**	[4]**50**
			220	12.6	43,000				1.73	28	42	30	60
			230	13.8	47,000				1.73	28	42	30	60
			240	15.0	51,200				1.73	28	42	30	60

[1]Electric heater capacity only — does not include additional blower motor heat capacity.
[3]Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F (75°C).
[4]**Bold text indicates that the circuit breaker on "CB" circuit breaker models must be replaced with size noted. See Optional Circuit Breaker table for catalog numbers.**
NOTE - Circuit 1 Minimum Circuit Ampacity includes the Blower Motor Full Load Amps.

TABLE 3

CBX32M-036 AND CBX32M-042 ELECTRIC HEAT DATA

SINGLE PHASE ELECTRIC HEAT						CBX32M-036					CBX32M-042				
			Input			Blower Motor Full Load Amps	[3]Minimum Circuit Ampacity		Maximum Fuse Size		Blower Motor Full Load Amps	[3]Minimum Circuit Ampacity		Maximum Fuse Size	
Model Number	No. of Steps	Volts	kW	[1]Btuh		Circuit 1	Circuit 2	Circuit 1	Circuit 2		Circuit 1	Circuit 2	Circuit 1	Circuit 2
5 kW 4 lbs. ECB29-5 **(28K31)** Terminal Block; ECB29-5CB **(28K32)** 30A Circuit breaker	1	208	3.8	12,800	1.73	25	- - -	[4]**25**	- - -	2.4	26	- - -	30	- - -
		220	4.2	14,300	1.73	28	- - -	30	- - -	2.4	29	- - -	30	- - -
		230	4.6	15,700	1.73	28	- - -	30	- - -	2.4	29	- - -	30	- - -
		240	5.0	17,100	1.73	28	- - -	30	- - -	2.4	29	- - -	30	- - -
6 kW 4 lbs. ECB29-6 **(47L22)** Terminal Block; ECB29-6CB **(47L23)** 35A Circuit breaker	1	208	4.5	15,400	1.73	30	- - -	[4]**30**	- - -	2.4	30	- - -	[4]**30**	- - -
		220	5.0	17,100	1.73	33	- - -	35	- - -	2.4	34	- - -	35	- - -
		230	5.5	18,800	1.73	33	- - -	35	- - -	2.4	34	- - -	35	- - -
		240	6.0	20,500	1.73	33	- - -	35	- - -	2.4	34	- - -	35	- - -
8 kW 5 lbs. ECB29-8 **(28K33)** Terminal Block; ECB29-8CB **(28K34)** 45A Circuit breaker	2	208	6.0	20,500	1.73	38	- - -	[4]**40**	- - -	2.4	40	- - -	[4]**40**	- - -
		220	6.7	22,900	1.73	44	- - -	45	- - -	2.4	45	- - -	45	- - -
		230	7.3	25,100	1.73	44	- - -	45	- - -	2.4	45	- - -	45	- - -
		240	8.0	27,300	1.73	44	- - -	45	- - -	2.4	45	- - -	45	- - -
9 kW 5 lbs. ECB29-9CB **(10L11)** 50A Circuit breaker; ECB29EH-9CB **(91K67)** 50A Circuit breaker	2	208	6.8	25,600	1.73	43	- - -	[4]**45**	- - -	2.4	44	- - -	[4]**45**	- - -
		220	7.6	28,700	1.73	49	- - -	50	- - -	2.4	50	- - -	50	- - -
		230	8.3	31,400	1.73	49	- - -	50	- - -	2.4	50	- - -	50	- - -
		240	9.0	34,100	1.73	49	- - -	50	- - -	2.4	50	- - -	50	- - -
10 kW 6 lbs. ECB29-10 **(28K35)** Terminal Block; ECB29-10CB **(28K36)** 60A Circuit breaker	2	208	7.5	25,600	1.73	47	- - -	[4]**50**	- - -	2.4	48	- - -	[4]**50**	- - -
		220	8.4	28,700	1.73	54	- - -	60	- - -	2.4	55	- - -	60	- - -
		230	9.2	31,400	1.73	54	- - -	60	- - -	2.4	55	- - -	60	- - -
		240	10.0	34,100	1.73	54	- - -	60	- - -	2.4	55	- - -	60	- - -
12.5 kW 10 lbs. ECB29-12.5CB **(28K37)** (1) 25A & (1) 50A Circuit breaker; ECB29EH-12.5CB **(91K68)** (1) 25A & (1) 50A Circuit breaker	3	208	9.4	32,000	1.73	21	31	25	[4]**45**	2.4	22	31	25	[4]**45**
		220	10.5	35,800	1.73	24	35	25	50	2.4	25	35	25	50
		230	11.5	39,200	1.73	24	35	25	50	2.4	25	35	25	50
		240	12.5	42,600	1.73	24	35	25	50	2.4	25	35	25	50
15 kW 12 lbs. ECB29-15CB **(28K38)** (1) 30A & (1) 60A Circuit Breaker; ECB29EH-15CB **(91K69)** (1) 30A & (1) 60A Circuit Breaker	3	208	11.3	38,400	1.73	24	37	[4]**25**	[4]**50**	2.4	26	37	30	[4]**50**
		220	12.6	43,000	1.73	28	42	30	60	2.4	29	42	30	60
		230	13.8	47,000	1.73	28	42	30	60	2.4	29	42	30	60
		240	15.0	51,200	1.73	28	42	30	60	2.4	29	42	30	60
20 kW 19 lbs. ECB29-20CB **(11L31)** (1) 50A & (1) 60A Circuit Breaker; ECB29EH-20CB **(91K70)** (1) 50A & (1) 60A Circuit Breaker	4	208	15.0	51,200	1.73	44	41	[4]**45**	60	2.4	45	41	[4]**45**	60
		220	16.8	57,300	1.73	49	46	50	60	2.4	50	46	50	60
		230	18.4	62,700	1.73	49	46	50	60	2.4	50	46	50	60
		240	20.0	68,200	1.73	49	46	50	60	2.4	50	46	50	60
THREE PHASE ELECTRIC HEAT						**CBX32M-036**					**CBX32M-042**			
8 kW 5 lbs. ECB29-8 **(28K42)** Terminal Block	3	208	6.0	20,500	1.73	23	- - -	25	- - -	2.4	24	- - -	25	- - -
		220	6.7	22,900	1.73	26	- - -	30	- - -	2.4	27	- - -	30	- - -
		230	7.3	25,100	1.73	26	- - -	30	- - -	2.4	27	- - -	30	- - -
		240	8.0	27,300	1.73	26	- - -	30	- - -	2.4	27	- - -	30	- - -
10 kW 6 lbs. ECB29-10 **(28K43)** Terminal Block	3	208	7.5	25,600	1.73	28	- - -	30	- - -	2.4	29	- - -	30	- - -
		220	8.4	28,700	1.73	32	- - -	35	- - -	2.4	33	- - -	35	- - -
		230	9.2	31,400	1.73	32	- - -	35	- - -	2.4	33	- - -	35	- - -
		240	10.0	34,100	1.73	32	- - -	35	- - -	2.4	33	- - -	35	- - -
15 kW 12 lbs. ECB29-15CB **(28K44)** (1) 50A Circuit breaker	3	208	11.3	38,400	1.73	41	- - -	[4]**45**	- - -	2.4	42	- - -	[4]**45**	- - -
		220	12.6	43,000	1.73	47	- - -	50	- - -	2.4	48	- - -	50	- - -
		230	13.5	47,000	1.73	47	- - -	50	- - -	2.4	48	- - -	50	- - -
		240	15.0	51,200	1.73	47	- - -	50	- - -	2.4	48	- - -	50	- - -
20 kW 19 lbs. ECB29-20CB **(28K45)** (2) 35A Circuit breaker	6	208	15.0	51,200	1.73	28	21	[4]**30**	[4]**30**	2.4	29	21	[4]**30**	[4]**30**
		220	16.8	57,300	1.73	32	24	35	35	2.4	33	24	35	35
		230	18.4	62,700	1.73	32	24	35	35	2.4	33	24	35	35
		240	20.0	68,200	1.73	32	24	35	35	2.4	33	24	35	35

[1]Electric heater capacity only — does not include additional blower motor heat capacity.
[3]Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F (75°C).
[4]**Bold text indicates that the circuit breaker on "CB" circuit breaker models must be replaced with size noted. See Optional Circuit Breaker table for catalog numbers.**
NOTE - Circuit 1 Minimum Circuit Ampacity includes the Blower Motor Full Load Amps.

TABLE 4

CBX32M-048 AND CBX32M-060 ELECTRIC HEAT DATA

SINGLE PHASE ELECTRIC HEAT						CBX32M-048							CBX32M-060						
		No. of Steps	Input			Blower Motor Full Load Amps	[3]Minimum Circuit Ampacity Circuit			Maximum Fuse Size Circuit			Blower Motor Full Load Amps	[3]Minimum Circuit Ampacity Circuit			Maximum Fuse Size Circuit		
	Model Number		Volts	kW	[1]Btuh		1	2	3	1	2	3		1	2	3	1	2	3
5 kW	ECB29-5 **(28K31)**	1	208	3.8	12,800	2.4	26	---	---	30	---	---	4.0	27	---	---	30	---	---
4 lbs.	Terminal Block		220	4.2	14,300	2.4	29	---	---	30	---	---	4.0	31	---	---	35	---	---
	ECB29-5CB **(28K32)**		230	4.6	15,700	2.4	29	---	---	30	---	---	4.0	31	---	---	35	---	---
	30A Circuit breaker		240	5.0	17,100	2.4	29	---	---	30	---	---	4.0	31	---	---	35	---	---
6 kW	ECB29-6 **(47L22)**	1	208	4.5	15,400	2.4	30	---	---	[4]**30**	---	---	4.0	31	---	---	35	---	---
4 lbs.	Terminal Block		220	5.0	17,100	2.4	34	---	---	35	---	---	4.0	36	---	---	40	---	---
	ECB29-6CB **(47L23)**		230	5.5	18,800	2.4	34	---	---	35	---	---	4.0	36	---	---	40	---	---
	35A Circuit breaker		240	6.0	20,500	2.4	34	---	---	35	---	---	4.0	36	---	---	40	---	---
8 kW	ECB29-8 **(28K33)**	2	208	6.0	20,500	2.4	40	---	---	[4]**40**	---	---	4.0	40	---	---	[4]**40**	---	---
5 lbs.	Terminal Block		220	6.7	22,900	2.4	45	---	---	45	---	---	4.0	47	---	---	50	---	---
	ECB29-8CB **(28K34)**		230	7.3	25,100	2.4	45	---	---	45	---	---	4.0	47	---	---	50	---	---
	45A Circuit breaker		240	8.0	27,300	2.4	45	---	---	45	---	---	4.0	47	---	---	50	---	---
9 kW	ECB29-9CB **(10L11)**	2	208	6.8	25,600	2.4	44	---	---	[4]**45**	---	---	4.0	45	---	---	[4]**45**	---	---
5 lbs.	50A Circuit breaker		220	7.6	28,700	2.4	50	---	---	50	---	---	4.0	52	---	---	60	---	---
	ECB29EH-9CB **(91K67)**		230	8.3	31,400	2.4	50	---	---	50	---	---	4.0	52	---	---	60	---	---
	50A Circuit breaker		240	9.0	34,100	2.4	50	---	---	50	---	---	4.0	52	---	---	60	---	---
10 kW	ECB29-10 **(28K35)**	2	208	7.5	25,600	2.4	48	---	---	[4]**50**	---	---	4.0	51	---	---	60	---	---
6 lbs.	Terminal Block		220	8.4	28,700	2.4	55	---	---	60	---	---	4.0	57	---	---	60	---	---
	ECB29-10CB **(28K36)**		230	9.2	31,400	2.4	55	---	---	60	---	---	4.0	57	---	---	60	---	---
	60A Circuit breaker		240	10.0	34,100	2.4	55	---	---	60	---	---	4.0	57	---	---	60	---	---
12.5 kW	ECB29-12.5CB **(28K37)**	3	208	9.4	32,000	2.4	22	31	---	25	[4]**45**	---	4.0	23	31	---	25	[4]**45**	---
10 lbs.	(1) 25A & (1) 50A Circuit breaker		220	10.5	35,800	2.4	25	35	---	25	50	---	4.0	27	35	---	30	50	---
	ECB29EH-12.5CB **(91K68)**		230	11.5	39,200	2.4	25	35	---	25	50	---	4.0	27	35	---	30	50	---
	(1) 25A & (1) 50A Circuit breaker		240	12.5	42,600	2.4	25	35	---	25	50	---	4.0	27	35	---	30	50	---
15 kW	ECB29-15CB **(28K38)**	3	208	11.3	38,400	2.4	26	37	---	30	[4]**50**	---	4.0	27	37	---	30	[4]**50**	---
12 lbs.	(1) 30A & (1) 60A Circuit breaker		220	12.6	43,000	2.4	29	42	---	30	60	---	4.0	31	42	---	35	60	---
	ECB29EH-15CB **(91K69)**		230	13.5	47,000	2.4	29	42	---	30	60	---	4.0	31	42	---	35	60	---
	(1) 30A & (1) 60A Circuit breaker		240	15.0	51,200	2.4	29	42	---	30	60	---	4.0	31	42	---	35	60	---
20 kW	ECB29-20CB **(11L31)**	4	208	15.0	51,200	2.4	45	41	---	[4]**45**	60	---	4.0	46	41	---	50	60	---
19 lbs.	(1) 50A & (1) 60A Circuit breaker		220	16.8	57,300	2.4	50	46	---	50	60	---	4.0	52	46	---	60	60	---
	ECB29EH-20CB **(91K70)**		230	18.4	62,700	2.4	50	46	---	50	60	---	4.0	52	46	---	60	60	---
	(1) 50A & (1) 60A Circuit breaker		240	20.0	68,200	2.4	50	46	---	50	60	---	4.0	52	46	---	60	60	---
25 kW	ECB29-25CB **(28K40)**	5	208	18.8	64,100	2.4	40	31	31	[4]**40**	[4]**45**	[4]**45**	4.0	42	31	31	[4]**45**	[4]**45**	[4]**45**
19 lbs.	(3) 50A Circuit breakers		220	21.0	71,700	2.4	47	35	35	50	50	50	4.0	48	35	35	50	50	50
			230	23.0	78,300	2.4	47	35	35	50	50	50	4.0	48	35	35	50	50	50
			240	25.0	85,300	2.4	47	35	35	50	50	50	4.0	48	35	35	50	50	50
30 kW	ECB29-30CB **(28K41)**	5	208	18.8	64,100								4.0	51	37	37	60	[4]**50**	[4]**50**
19 lbs.	(3) 60A Circuit breakers		220	21.0	71,700								4.0	56	42	42	60	60	60
			230	23.0	78,300					Not Available			4.0	56	42	42	60	60	60
			240	25.0	85,300								4.0	56	42	42	60	60	60
THREE PHASE ELECTRIC HEAT						CBX32M-048							CBX32M-060						
8 kW	ECB29-8 **(28K42)**	3	208	6.0	20,500	2.4	24	---	---	25	---	---	4.0	25	---	---	25	---	---
5 lbs.	Terminal block		220	6.7	22,900	2.4	27	---	---	30	---	---	4.0	29	---	---	30	---	---
			230	7.3	25,100	2.4	27	---	---	30	---	---	4.0	29	---	---	30	---	---
			240	8.0	27,300	2.4	27	---	---	30	---	---	4.0	29	---	---	30	---	---
10 kW	ECB29-10 **(28K43)**	3	208	7.5	25,600	2.4	29	---	---	30	---	---	4.0	30	---	---	30	---	---
6 lbs.	Terminal Block		220	8.4	28,700	2.4	33	---	---	35	---	---	4.0	35	---	---	35	---	---
			230	9.2	31,400	2.4	33	---	---	35	---	---	4.0	35	---	---	35	---	---
			240	10.0	34,100	2.4	33	---	---	35	---	---	4.0	35	---	---	35	---	---
15 kW	ECB29-15CB **(28K44)**	3	208	11.3	38,400	2.4	42	---	---	[4]**45**	---	---	4.0	43	---	---	[4]**45**	---	---
12 lbs.	50A Circuit breaker		220	12.6	43,000	2.4	48	---	---	50	---	---	4.0	50	---	---	50	---	---
			230	13.5	47,000	2.4	48	---	---	50	---	---	4.0	50	---	---	50	---	---
			240	15.0	51,200	2.4	48	---	---	50	---	---	4.0	50	---	---	50	---	---
20 kW	ECB29-20CB **(28K45)**	6	208	15.0	51,200	2.4	29	21	---	[4]**30**	[4]**30**	---	4.0	30	21	---	[4]**30**	[4]**30**	---
19 lbs.	(2) 35A Circuit breaker		220	16.8	57,300	2.4	33	24	---	35	35	---	4.0	35	24	---	35	35	---
			230	18.4	62,700	2.4	33	24	---	35	35	---	4.0	35	24	---	35	35	---
			240	20.0	68,200	2.4	33	24	---	35	35	---	4.0	35	24	---	35	35	---
25 kW	ECB29-25CB **(28K46)**	6	208	18.8	64,100	2.4	35	27	---	[4]**40**	[4]**40**	---	4.0	37	27	---	[4]**40**	[4]**40**	---
19 lbs.	(2) 45A Circuit breaker		220	21.0	71,700	2.4	41	30	---	45	45	---	4.0	43	30	---	45	45	---
			230	23.0	78,300	2.4	41	30	---	45	45	---	4.0	43	30	---	45	45	---
			240	25.0	85,300	2.4	41	30	---	45	45	---	4.0	43	30	---	45	45	---

[1]Electric heater capacity only — does not include additional blower motor heat capacity.
[3]Refer to National or Canadian Electrical Code manual to determine wire, fuse and disconnect size requirements. Use wires suitable for at least 167°F (75°C).
[4]**Bold text indicates that the circuit breaker on "CB" circuit breaker models must be replaced with size noted. See Optional Circuit Breaker table for catalog numbers.**
[5]All 575v electric heaters are used with 460v CB30M-51 & -65 blower coil units. A 575v to 460v Step-down transformer for the blower coil unit is furnished with all 575v electric heaters. Blower motor is rated at **460v.**
NOTE - Circuit 1 Minimum Circuit Ampacity includes the Blower Motor Full Load Amps.

III-OPTIONAL ECB29 ELECTRIC HEAT

A-Matchups and Ratings

Tables 2 through 4 show all approved CBX32M to ECB29 matchups and electrical ratings.

B-Electric Heat Components

ECB29 parts arrangement is shown in figures 5 through 9. All electric heat sections consist of components mounted to the electric heat vestibule panel and electric heating elements exposed directly to the airstream. 208/230V electric heat sections may be equipped with circuit breakers. The circuit breakers are designated by CB in the model number. 460 and 575 volt electric heat sections are equipped with fuses. The electric heat section is connected to the unit via jack J2, which plugs into plug P2 of the unit.

1-Electric Heat Sequencer Relays (K32, K33, K34, K35, K116, K117) (208/230 volt only)

Relays K32, K33, K34, K35, K116 and K117 are N.O. sequencer relays with a resistive element for a coil and a bi-metal disk which actuates the contacts. The relays are located on the electric heat vestibule panel and are energized by a 24V heating demand (W1, W2, and W3) via jack/plug 2. When energized, the internal resistance heats the bi-metal disk causing the contacts to close. When the relay is de-energized, the disk cools and the contacts open. The relays energize different stages of heat, as well as the blower. The blower is always first on and last off.

2-Primary(S15) & Secondary(S20) Temperature Limits

Both the primary (S15) and secondary (S20) limits are located on the electric heat vestibule panel and are exposed directly to the airstream through an opening in the panel. The high temperature limits are SPST N.C. limits with the primary limit being an auto-reset limit and the secondary limit being a “one-time” limit. One-time limits need to be replaced when opened. The limits are factory set and are not adjustable.

208/230 Volt Electric Heat Sections

Each stage of the 208/230 electric heat is protected by a primary (S15) and secondary (S20) high temperature limit. Both S15 and S20 are located in the same housing. Each stage use the same style of limits. Both the primary and secondary limits are wired in series with a heat element. When either S15 or S20 opens, the corresponding heat element is de-energized. All other heating elements remain energized. The primary high temperature limit opens at 150°F ± 5°F (65.5°C ± 2.8°C) on a temperature rise and automatically resets at 110°F ± 9°F (43.3°C ± 5.0°C) on a temperature fall. The secondary high temperature limit opens at 333°F ± 10°F (167.2°C ± 5.6°C) on a temperature rise. If the secondary limit opens it will need to be replaced.

3-Circuit Breaker (CB1, CB2, and CB3) (208/230 volt only)

Line voltage connections are made to circuit breakers CB1, CB2, and CB3 in the electric heat sections with circuit breakers (designated by CB in the model numbers). Table 5 shows the amp rating for each circuit breaker used. Single phase electric heat uses two pole circuit breakers; while three phase electric heat uses three pole circuit breakers.

TABLE 5

ECB29 CIRCUIT BREAKERS			
UNIT	CB1 AMPS	CB2 AMPS	CB3 AMPS
ECB29-5CB-1 (P)	30 AMP	---	---
ECB29-8CB-1 (P)	50 AMP	---	---
ECB29-10CB-1 (P)	60 AMP	---	---
ECB29-12.5CB-1 (P)	25 AMP	50 AMP	---
ECB29-15CB-1 (P)	30 AMP	60 AMP	---
ECB29-20CB-1 (P)	60 AMP	60 AMP	---
ECB29-25CB-1 (P)	50 AMP	50 AMP	50 AMP
ECB29-30CB-1 (P)	60 AMP	60 AMP	60 AMP
ECB29-15CB-1 (Y)	60 AMP	---	---
ECB29-20CB-1 (Y)	40 AMP	35 AMP	---
ECB29-25CB-1 (Y)	50 AMP	35 AMP	---

Note: Do not remove patch plate or insulation on units without circuit breakers!!

4-Terminal Strip (TB2) 208/230 volt only)

For the electric heat sections without circuit breakers or fuses, line voltage connections are made to terminal strip TB2. The terminal strip is located in the lower left corner of the electric heat vestibule panel. Single phase electric heat uses two pole terminal strips; while three phase electric heat uses three pole terminal strips.

5-Heating Elements (HE1 through HE6)

Heating elements are composed of helix wound bare nichrome wire exposed directly to the airstream. The elements are supported by insulators mounted to the wire frame. For single phase applications, one element is used per stage. Each stage is energized independently by the corresponding relay located on the electric heat vestibule panel. All three phase heating elements are arranged in a three phase delta. Once energized, heat transfer is instantaneous. High temperature protection is provided by primary and secondary high temperature limits.

ECB29-2.5, -5, -5CB 208/230 SINGLE PHASE ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT

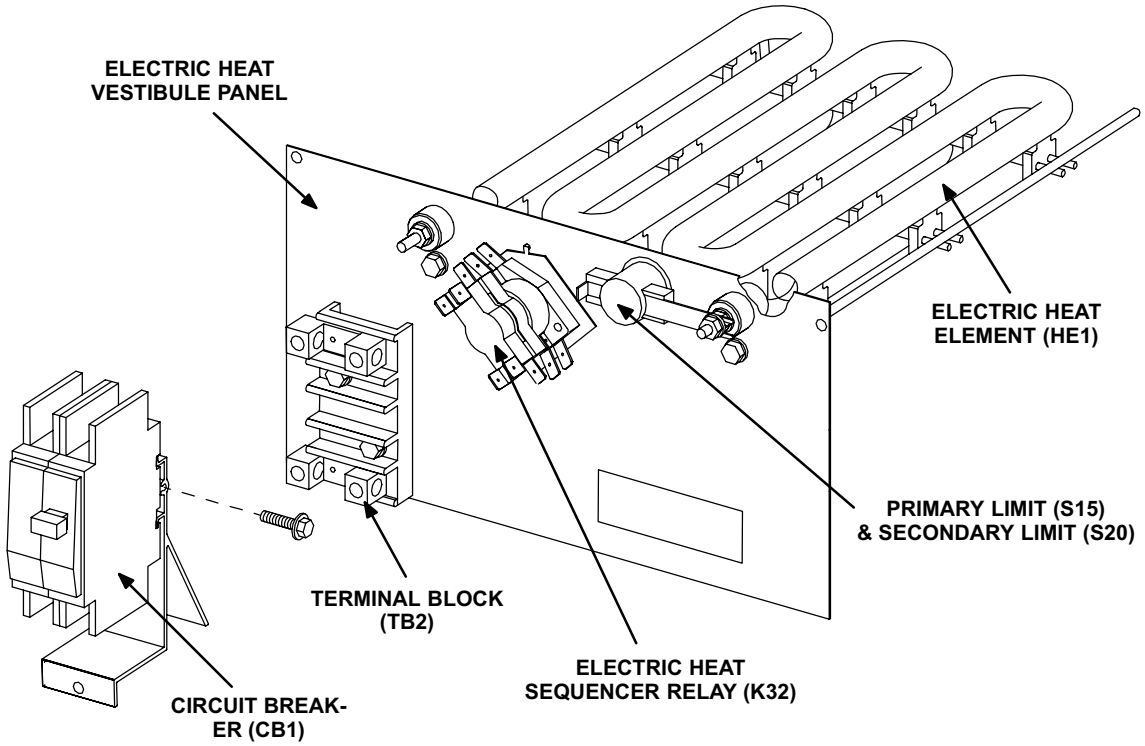

ELECTRIC HEAT VESTIBULE PANEL
ELECTRIC HEAT ELEMENT (HE1)
PRIMARY LIMIT (S15) & SECONDARY LIMIT (S20)
TERMINAL BLOCK (TB2)
ELECTRIC HEAT SEQUENCER RELAY (K32)
CIRCUIT BREAK-ER (CB1)

FIGURE 5

ECB29-8, -8CB, -10, -10CB 208/230 SINGLE PHASE ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT

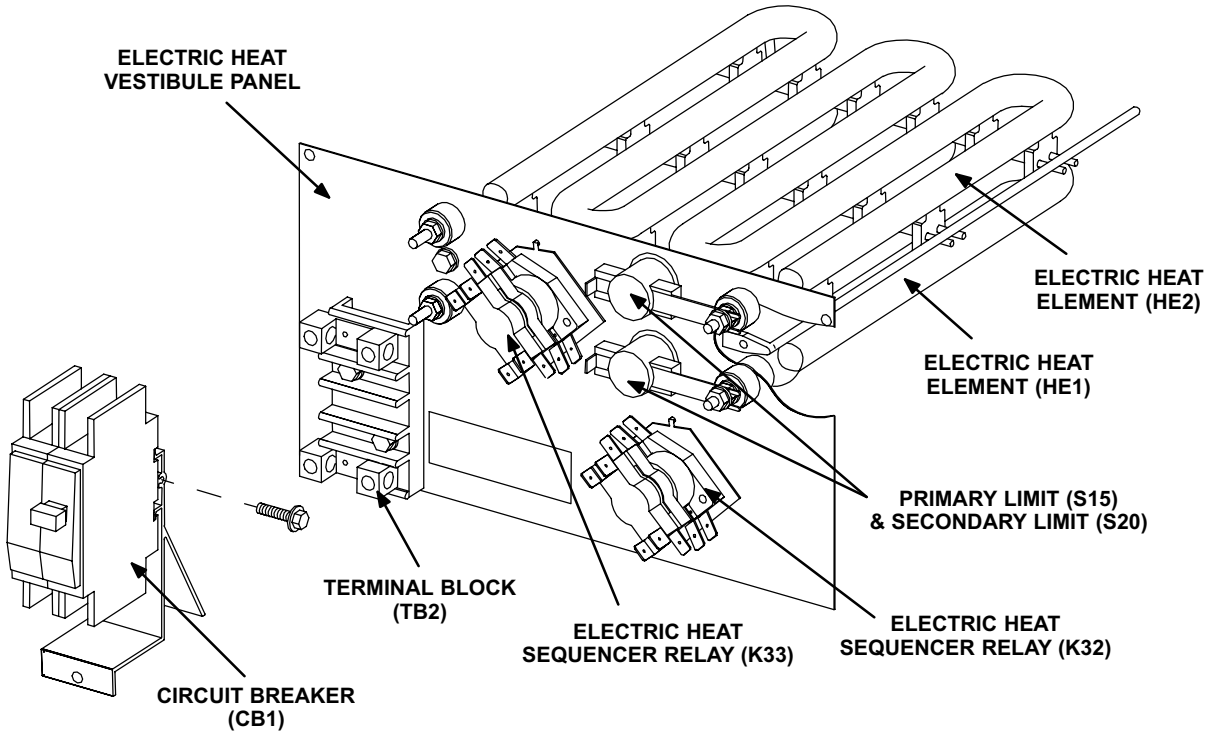

ELECTRIC HEAT VESTIBULE PANEL
ELECTRIC HEAT ELEMENT (HE2)
ELECTRIC HEAT ELEMENT (HE1)
PRIMARY LIMIT (S15) & SECONDARY LIMIT (S20)
TERMINAL BLOCK (TB2)
ELECTRIC HEAT SEQUENCER RELAY (K33)
ELECTRIC HEAT SEQUENCER RELAY (K32)
CIRCUIT BREAKER (CB1)

FIGURE 6

ECB29-8, -10 208/230 THREE PHASE
ECB29-12.5CB, -15CB 208/230 SINGLE & THREE PHASE
ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT

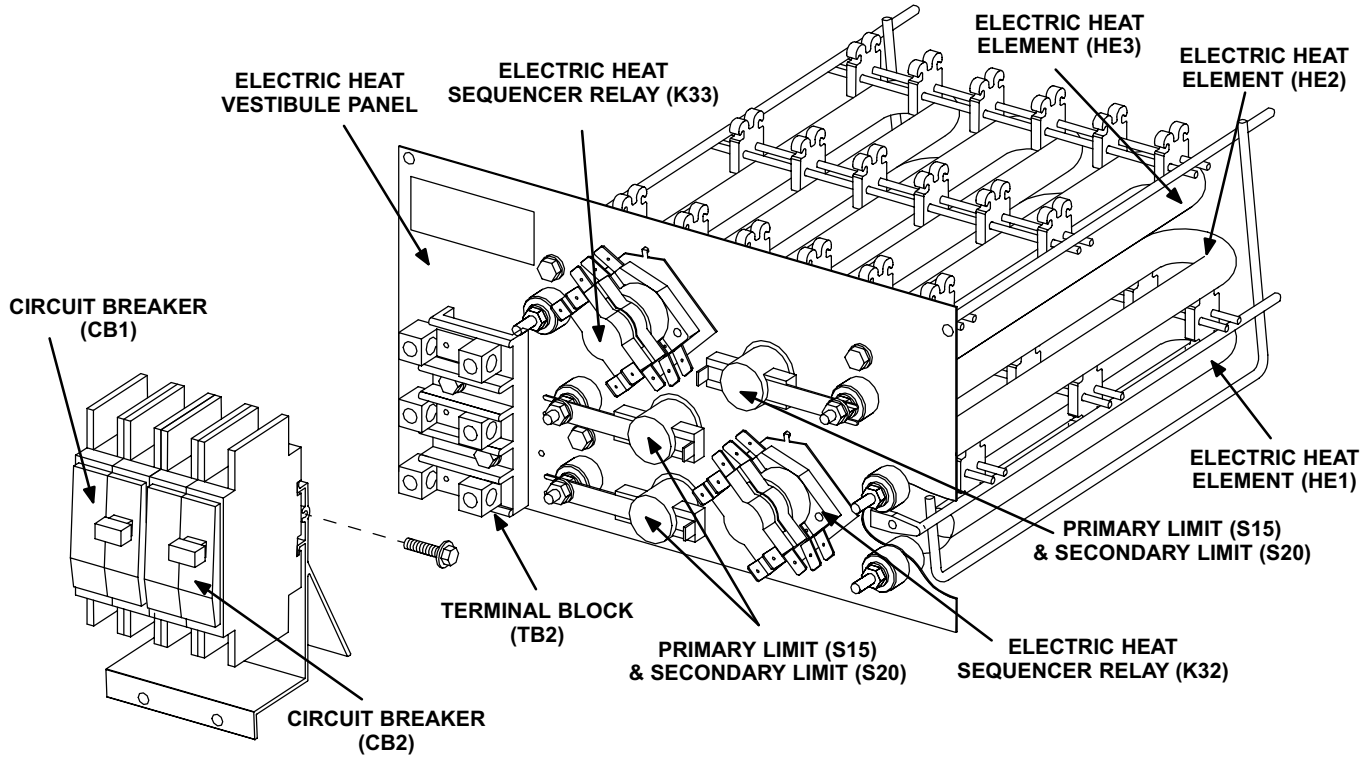

ELECTRIC HEAT ELEMENT (HE3)
ELECTRIC HEAT ELEMENT (HE2)
ELECTRIC HEAT VESTIBULE PANEL
ELECTRIC HEAT SEQUENCER RELAY (K33)
CIRCUIT BREAKER (CB1)
ELECTRIC HEAT ELEMENT (HE1)
PRIMARY LIMIT (S15) & SECONDARY LIMIT (S20)
TERMINAL BLOCK (TB2)
PRIMARY LIMIT (S15) & SECONDARY LIMIT (S20)
ELECTRIC HEAT SEQUENCER RELAY (K32)
CIRCUIT BREAKER (CB2)

FIGURE 7

ECB29-20CB 208/230 SINGLE PHASE
ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT

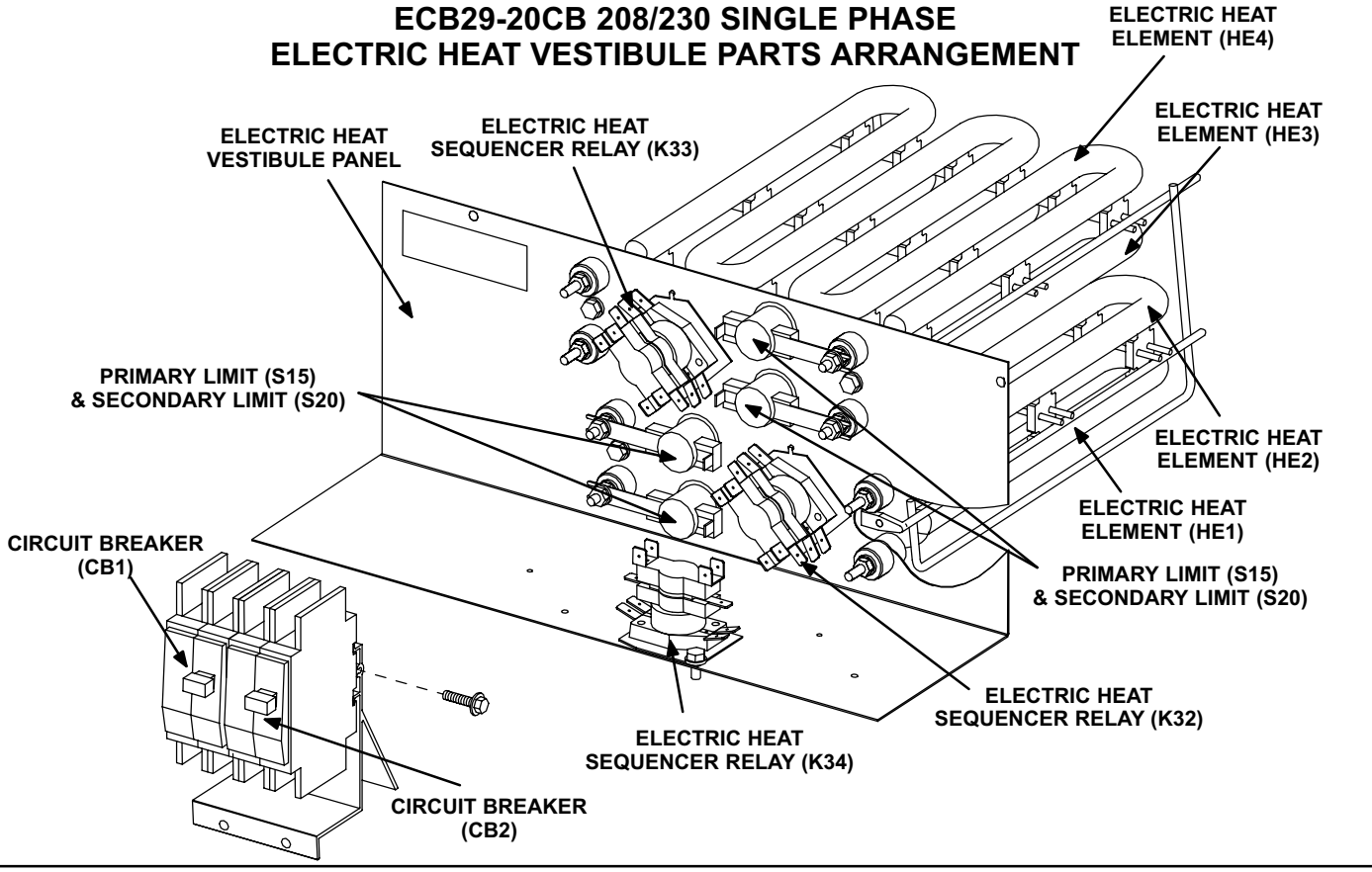

ELECTRIC HEAT ELEMENT (HE4)
ELECTRIC HEAT ELEMENT (HE3)
ELECTRIC HEAT VESTIBULE PANEL
ELECTRIC HEAT SEQUENCER RELAY (K33)
PRIMARY LIMIT (S15) & SECONDARY LIMIT (S20)
ELECTRIC HEAT ELEMENT (HE2)
ELECTRIC HEAT ELEMENT (HE1)
CIRCUIT BREAKER (CB1)
PRIMARY LIMIT (S15) & SECONDARY LIMIT (S20)
ELECTRIC HEAT SEQUENCER RELAY (K32)
ELECTRIC HEAT SEQUENCER RELAY (K34)
CIRCUIT BREAKER (CB2)

FIGURE 8

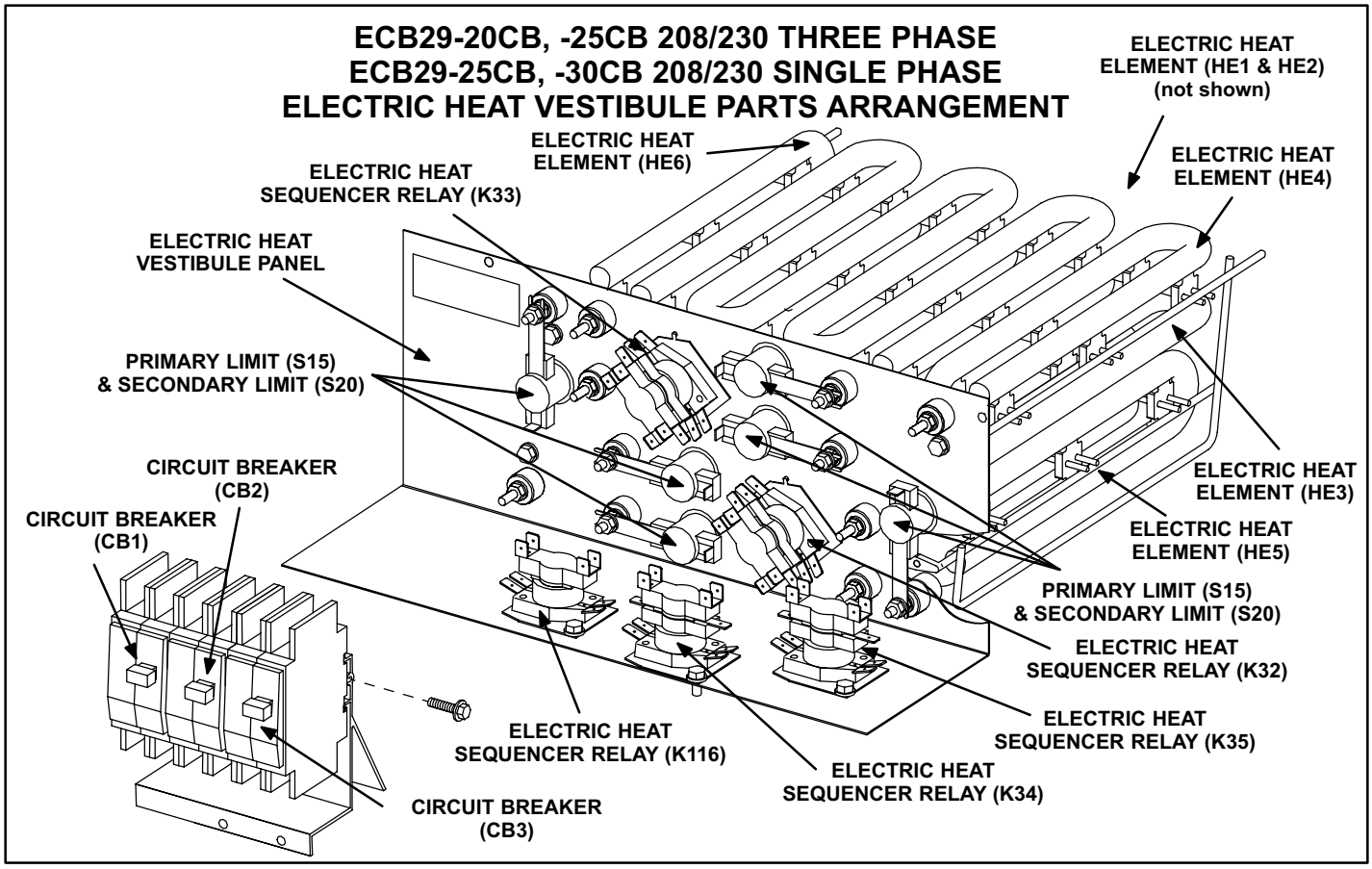

ECB29-20CB, -25CB 208/230 THREE PHASE
ECB29-25CB, -30CB 208/230 SINGLE PHASE
ELECTRIC HEAT VESTIBULE PARTS ARRANGEMENT
ELECTRIC HEAT ELEMENT (HE1 & HE2) (not shown)
ELECTRIC HEAT ELEMENT (HE6)
ELECTRIC HEAT SEQUENCER RELAY (K33)
ELECTRIC HEAT ELEMENT (HE4)
ELECTRIC HEAT VESTIBULE PANEL
PRIMARY LIMIT (S15) & SECONDARY LIMIT (S20)
CIRCUIT BREAKER (CB2)
CIRCUIT BREAKER (CB1)
ELECTRIC HEAT ELEMENT (HE3)
ELECTRIC HEAT ELEMENT (HE5)
PRIMARY LIMIT (S15) & SECONDARY LIMIT (S20)
ELECTRIC HEAT SEQUENCER RELAY (K32)
ELECTRIC HEAT SEQUENCER RELAY (K35)
ELECTRIC HEAT SEQUENCER RELAY (K116)
ELECTRIC HEAT SEQUENCER RELAY (K34)
CIRCUIT BREAKER (CB3)

FIGURE 9

IV-CONFIGURATION MODIFICATIONS

CBX32M units may be installed in the upflow, downflow, horizontal right-hand discharge or horizontal left-hand discharge orientation.

The units come from the factory ready for upflow or horizontal right-hand discharge installation. If the unit needs to be modified from its original configuration, use the following procedures. All procedures assume the unit has not been modified from the factory.

A-Disassembly of CBX32M Cabinet

For tight applications where a modular design is an advantage, the CBX32M unit can be easily disassembled and reassembled. By removing four screws, the coil lifts off so the unit is in two parts. To disassemble the CBX32M, use the following procedure.

1- Remove the two black screws located just above the seam in the top half of the unit.

2- Remove the front access panel and remove the two screws on the inside of the top half of the cabinet on both sides.

3- Lift the top section apart from the bottom section.

4- To lighten the cabinet for lifting, the blower and coil assemblies can also be removed.

5- Reassemble once the cabinet is in place.

B-Upflow Application

1- Discard drip shields, if applicable. The shields are used for downflow applications only and are located with the foam pads on top of new units.

2- For best efficiency and air flow, the horizontal drain pan should be removed from units in upflow configurations.

3- After removing horizontal drain pan, place unit in desired location. Set unit so that it is level. Connect return and supply air plenums as required using sheet metal screws. See figure 10.

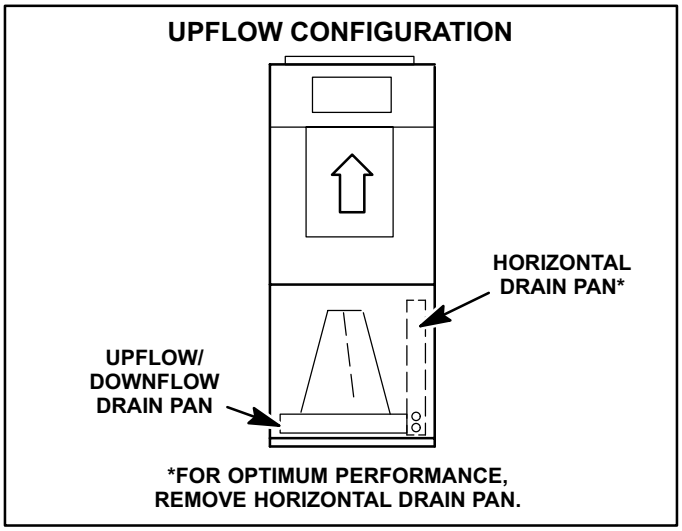

UPFLOW CONFIGURATION
HORIZONTAL DRAIN PAN*
UPFLOW/ DOWNFLOW DRAIN PAN
*FOR OPTIMUM PERFORMANCE, REMOVE HORIZONTAL DRAIN PAN.

FIGURE 10

C-Downflow Application

NOTE -CBX32M-018/024 units do not require downflow drip sheilds.

The following tables outline the sizes of the various drip shields.

TABLE 6
Downflow Drip Shields

CBX32M Unit	Part No.	Length	Width
-030	LB-88658	15.75	2.9187
-036, -042	LB-88663	17.75	3.9187
-048, -060	LB-88664	19.75	3.9187

1 - Remove the access panels. If necessary, remove the corrugated padding between the blower and coil assembly before operating the unit. Remove the drip shields from the foam pads on the top of the unit.

2 - Remove the coil assembly from the unit.

3 - For best efficiency and air flow, remove the horizontal drain pan from the units in downflow positions. See figure 11.

4 - Rotate cabinet 180° from the upright position. See figure 11. You may need to first remove the blower assembly to lighten the cabinet for lifting.

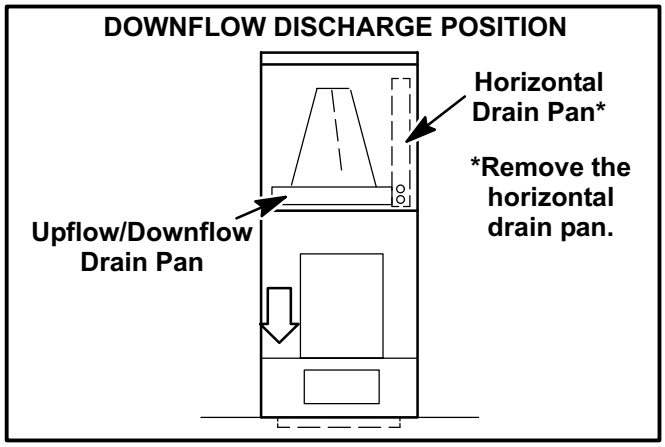


FIGURE 11

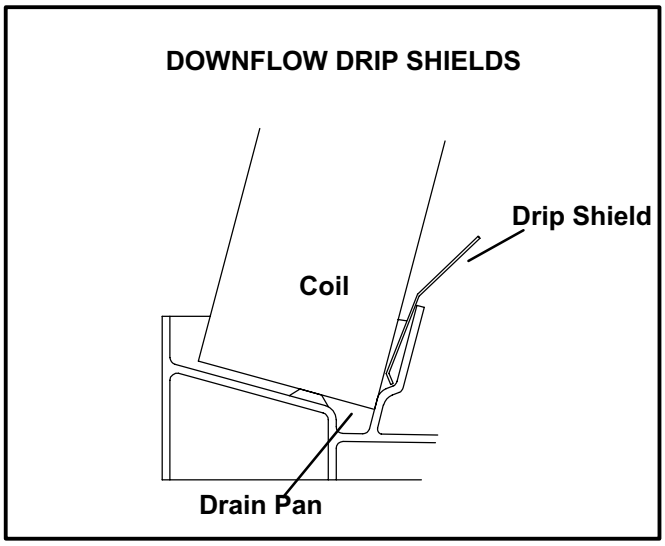


FIGURE 12

5 - From the underside of the coil, install the downflow drip shield firmly in place. See figure 12.

6 - Replace the coil assembly and blower if you have removed it. Replace the coil access panel. See figure 11.

7 - Set the unit so that it is level. Connect the return and supply air plenums as required using sheet metal screws.

NOTE - For downflow application, you must use metal or class I supply and return air plenums.

NOTE-For downflow application, metal or class I supply and return air plenums must be used.

For downflow installation on combustible flooring, an additive base must be used. See figure 13.

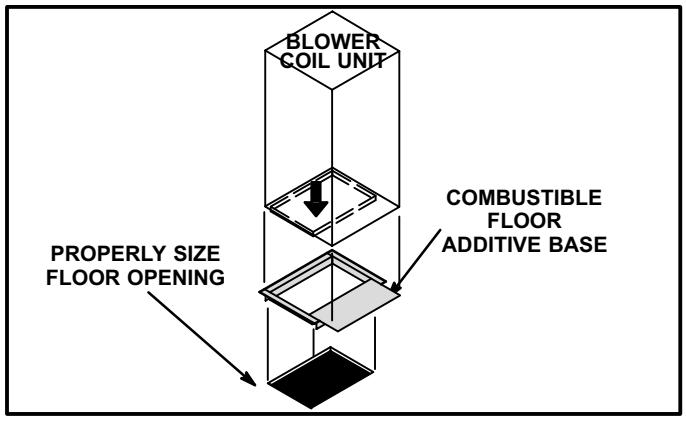


FIGURE 13

Cut an opening appropriately sized for combustible base. Base dimensions are shown in figure 14. After opening has been cut, set the additive base into opening. Connect outlet air plenum to the additive base. Set the unit on the additive base so flanges of the unit drop into the base opening and seal against the insulation strips. Seal around the insulation strips with permagum. The unit is now locked in place. Install return air plenum and secure with sheet metal screws.

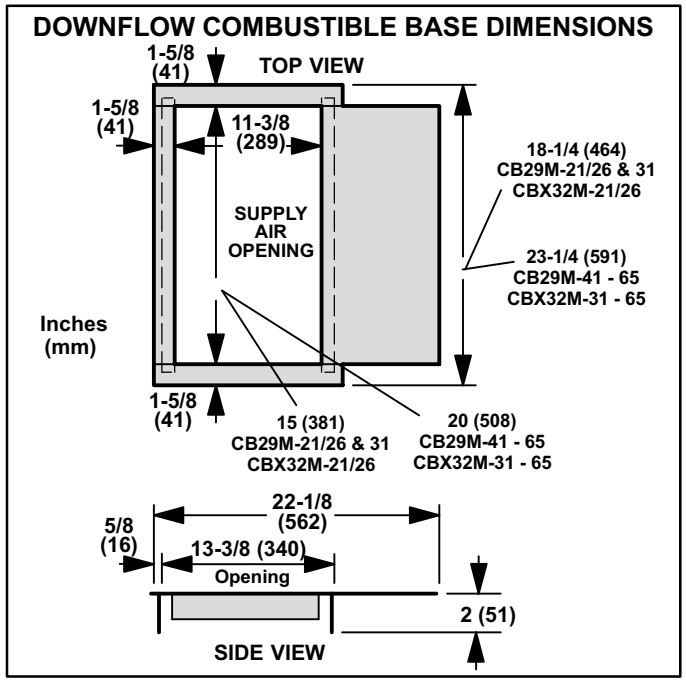


FIGURE 14

D-Horizontal Right-Hand Discharge Application

1- Discard drip shields, if applicable. The shields are used for downflow applications only.

2- Place blower coil on its right side.

3- No further adjustment is necessary. Set unit so it is sloped towards the drain pan (1/4" [6mm]). See figure 15.

NOTE-For horizontal applications, a secondary drain pan is recommended. Refer to local codes.

*NOTE-For horizontal applications in **high humidity areas**, remove the downflow rail closest to the drain pan. To remove rail, remove screw from rail at back of unit and at cabinet support rail. Remove downflow rail then replace screws. Also, seal around the exiting drain pipe, liquid and suction lines to prevent infiltration of humid air.*

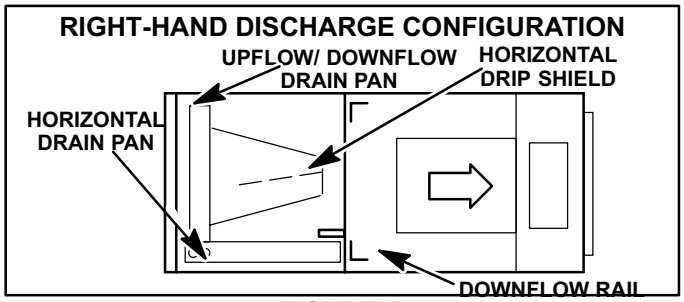


FIGURE 15

3- If hanging the unit, it must be supported along the entire length of the cabinet. If using chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) so that the full length of the cabinet is supported. Use securing screws no longer than 1/2" (13mm) to avoid damage to coil or filter. See figure 16. Connect return and supply air plenums as required using sheet metal screws.

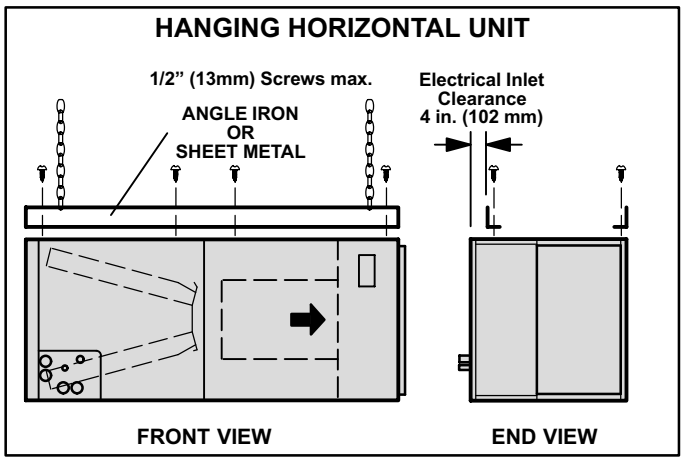


FIGURE 16

⚠ CAUTION

Danger of equipment damage and personal injury. Take care when removing coil assembly from unit installed in right or left-hand applications. Coil may tip into drain pan once clear of cabinet. Support coil when removing.

E-Horizontal Left-Hand Discharge Application

NOTE-For horizontal applications, a secondary drain pan is recommended. Refer to local codes.

1- Discard drip shields, if applicable. The shields are used for downflow applications only.

2- Pull coil assembly from unit. Pull off the horizontal drain pan.

3- Remove drain plugs from back drain holes on horizontal drain pan and re-install them on front holes.

4- Rotate drain pan 180° front to back and install it on the opposite side of coil.

5- Remove screws from top cap. Remove horizontal drip shield screw located in the center of the back coil end seal. See figure 17.

6- Rotate horizontal drip shield 180° front to back.

7- Remove plastic plug from left hole on coil front end seal and re-install plug in back hole. Re-install horizontal drip shield screw in front coil end seal. Drip shield should drain downward into horizontal drain pan inside coil.

8- Rotate top cap 180° front to back and align with unused screw holes. Holes must align with front and back coil end plates. Note that top cap has a 45° bend on one side and 90° bend on the other. **The 90° bend must be on the same side as the horizontal drain pan.** See figures 17 and 18.

NOTE-Use extreme care when re-installing screws into coil end plate engaging holes. Coil damage could result by misalignment.

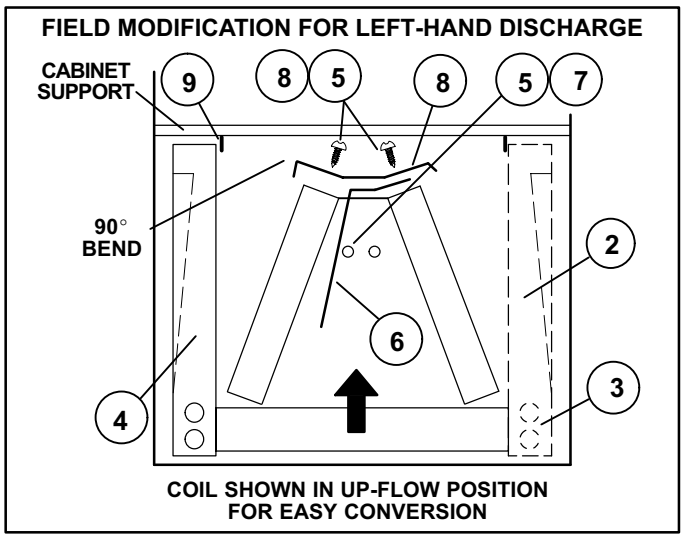


FIGURE 17

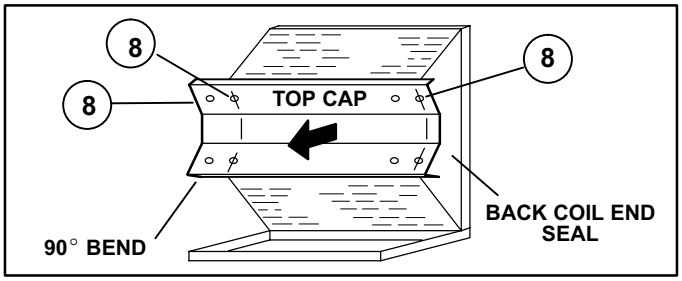


FIGURE 18

9- From the upflow position, replace coil assembly. Then flip cabinet 90° to the left and set into place. Replace coil assembly. Secure coil in place by bending down tab on cabinet support rail. See figures 17 and 19.

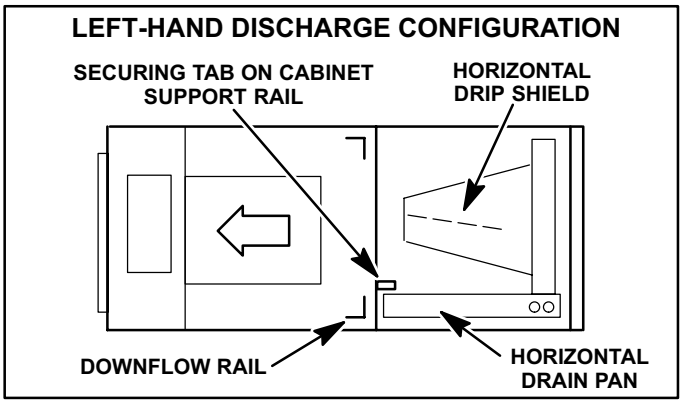


FIGURE 19

*NOTE-For horizontal applications in **high humidity areas**, remove the downflow rail closest to the drain pan. To remove rail, remove screw from rail at back of unit and at cabinet support rail. Remove downflow rail then replace screws. Also, seal around the exiting drain pipe, liquid and suction lines to prevent infiltration of humid air.*

11- Flip access door. Knock out the portion of door for the drain pipes and attach to the cabinet with screw provided. Replace access door on the unit.

12- Set unit so it is sloped towards the drain pan (1/4" [6mm]). Connect return and supply air plenums as required using sheet metal screws.

13- If hanging the unit, it must be supported along the entire length of the cabinet. If using chain or strap, use a piece of angle iron or sheet metal attached to the unit (either above or below) so that the full length of the cabinet is supported. Use securing screws no longer than 1/2" (13mm) to avoid damage to coil or filter. See figure 16. Connect return and supply air plenums as required using sheet metal screws.

F-Condensate Drain

A 5" (127mm) section of PVC pipe is provided with the unit. Cut the pipe in half and use to route the auxiliary and main drains. Connect main condensate drain and route downward to an open drain or sump. Do not connect drain to a closed waste system. Refer to figure 20 for typical condensate trap configuration.

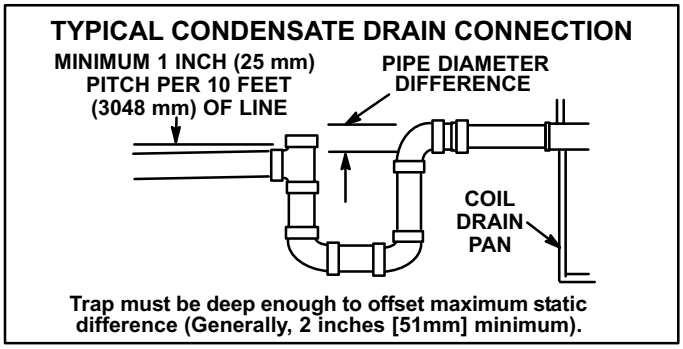

TYPICAL CONDENSATE DRAIN CONNECTION
MINIMUM 1 INCH (25 mm) PITCH PER 10 FEET (3048 mm) OF LINE
PIPE DIAMETER DIFFERENCE
COIL DRAIN PAN
Trap must be deep enough to offset maximum static difference (Generally, 2 inches [51mm] minimum).

FIGURE 20

It is recommended that the auxiliary drain be connected to a drain line for all units. If auxiliary drain is not connected, it must be plugged with provided cap. **For downflow units, the auxiliary drain MUST be connected and routed to a drain.** See figure 21 for auxiliary and main drain locations.

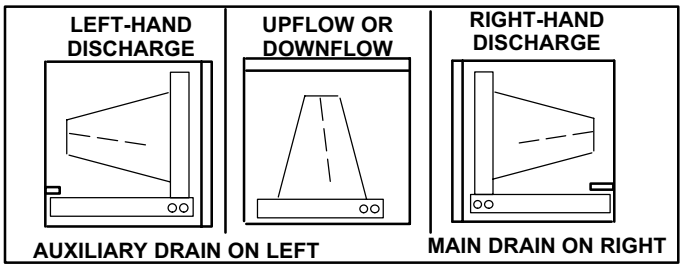


FIGURE 21

The following practices are recommended to ensure condensate removal:

1- Drain piping should not be smaller than the drain connections at drain pan.

2- A trap must be installed in the main drain line.

3- The trap must be deep enough to offset the difference in static pressure between drain pan and atmosphere. Generally, two inches is satisfactory for medium static applications.

4- Horizontal runs must be sloped 1" (25mm) per 10 feet (3.1m) of drain line to offset friction.

5- An open vent in drain line will sometimes be required due to line length, friction and static pressure.

6- Drains should be constructed in a manner to facilitate future cleaning and not to interfere with filter access. See figure 20.

7- Auxiliary drain should run to an area where homeowner will notice it draining. Refer to local codes.

V-START-UP - OPERATION

A-Preliminary and Seasonal Checks

1- Make sure the unit is installed in accordance with the installation instructions.

2- Inspect electrical wiring, both field and factory installed for loose connections. Tighten as required.

3- Check voltage at disconnect switch. Voltage must be within range listed on the nameplate. If not, consult the power company and have voltage condition corrected before starting unit.

4- Check to ensure that refrigerant lines are in good condition and pipe insulation is intact.

5- Inspect condition of condensate drain pan and piping assembly. Disassemble and clean seasonally.

B-Cooling Start-Up

NOTE-The following is a generalized procedure and does not apply to all thermostat control systems. Electronic thermostat control systems may operate differently.

1- Set fan switch to AUTO or ON and move the system selection switch to COOL. Adjust the thermostat to a setting far enough below room temperature to bring on the compressor. Compressor will start and cycle on demand from the thermostat.

2- The refrigerant circuit is charged with R410A refrigerant. See condensing unit rating plate for correct charge amount.

3- Refer to the correct condensing unit service manual for more information.

C-Heating Start-Up

1- Set the fan switch to AUTO or ON and move the system selection switch to HEAT. Adjust the thermostat setting above room temperature.

2- The indoor blower immediately starts and the electric heat will stage on based on sequencer timing.

D-Safety or Emergency Shutdown

Turn off unit power at circuit breaker.

E-Extended Period Shutdown

Turn off thermostat or set to “UNOCCUPIED” mode. Turn off power to unit. All access panels and covers must be in place and secured.

The condensate assembly should be clean and dry for extended period shutdown.

VI-TYPICAL OPERATING CHARACTERISTICS

A-Blower Operation and Adjustment

NOTE- The following is a generalized procedure and does not apply to all thermostat controls.

1- Blower operation is dependent on thermostat control system.

2- Generally, blower operation is set at thermostat subbase fan switch. With fan switch in ON position, blower operates continuously. With fan switch in AUTO position, blower cycles with demand.

3- In all cases, blower and entire unit will be off when the system switch is in OFF position.

B-External Static Pressure

1- Measure tap locations as shown in figure 22.

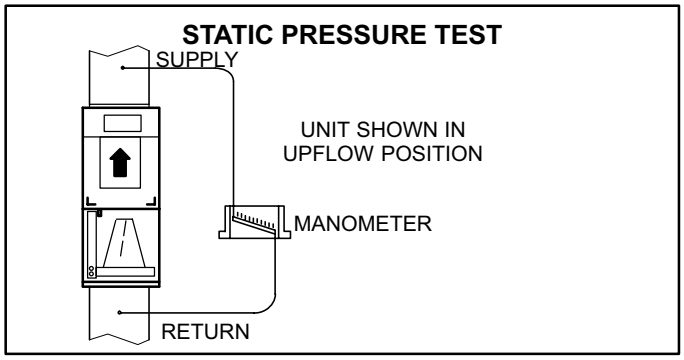


FIGURE 22

2- Punch a 1/4” (6mm) diameter hole in supply and return air plenums. Insert manometer hose flush with inside edge of hole or insulation. Seal around the hose with permagum. Connect the zero end of the manometer to the discharge (supply) side of the system. On ducted systems, connect the other end of manometer to the return duct as above. For systems with non-ducted returns, leave the other end of the manometer open to the atmosphere.

3- With only the blower motor running and the evaporator coil dry, observe the manometer reading. Adjust blower motor speed to deliver the air desired according to the job requirements.

4- External static pressure drop must not exceed 0.5” W.C. (1.2 kPa)

5- Seal around the hole when the check is complete.

C-Blower Speed Taps

Blower speed tap selection is accomplished by changing the taps at the blower motor harness connector. Disconnect harness connector from motor to expose speed selectors. Blower speed selections are listed on the wiring diagrams. Refer to the ECB29 installation instructions for minimum allowable blower speed, when using electric heat.

To Change Blower Speed

1- Turn off electric power to furnace.
2- Remove blower access door.
3- Disconnect blower motor harness from motor.
4- Select desired speeds for heating and cooling. (Black = cooling high speed, Orange = common, Yellow = electric heat only).
5- Depress harness connector tab to release wire terminal. Select connector location for new speed (refer to unit wiring diagram). Insert wire terminal until it is securely in place. See figure 23.
6- Replace harness connector to motor .

BLOWER SPEED TAP SELECTION

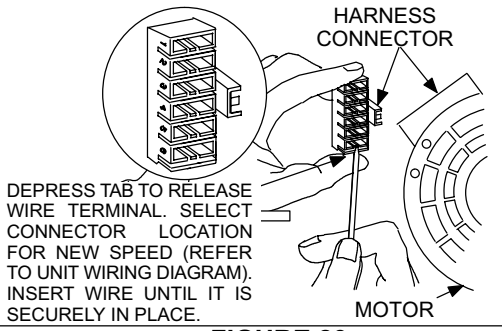

HARNESS CONNECTOR
DEPRESS TAB TO RELEASE WIRE TERMINAL. SELECT CONNECTOR LOCATION FOR NEW SPEED (REFER TO UNIT WIRING DIAGRAM). INSERT WIRE UNTIL IT IS SECURELY IN PLACE.
MOTOR

FIGURE 23

VII-MAINTENANCE

At the beginning of each heating/cooling season, the system should be checked as follows:

A-Filters

NOTE- Filter access panel must be in place during unit operation. Excessive warm air entering the unit may result in water blow-off problems.

TABLE 7

CBX32M FILTER SIZES	
Unit	Filter Size
CBX32M-018/024	15" X 20" (381mm X 508mm)
CBX32M-030, -036, -042	20" X 20" (508mm X 508mm)
CBX32M-048, -060	20" X 24" (508mm X 610mm)

To remove filter, loosen the thumbscrews holding the filter panel in place. Slide filter out of the guides on either side of cabinet, insert new filter and replace panel. Some models come with a spacer so standard size filters can be used. Filters should be inspected monthly and must be replaced when dirty to ensure proper blower coil operation. See table 7 for replacement filter sizes or see the sticker located on the filter access door specifying the size of the standard throw-away filter which is used with the unit.

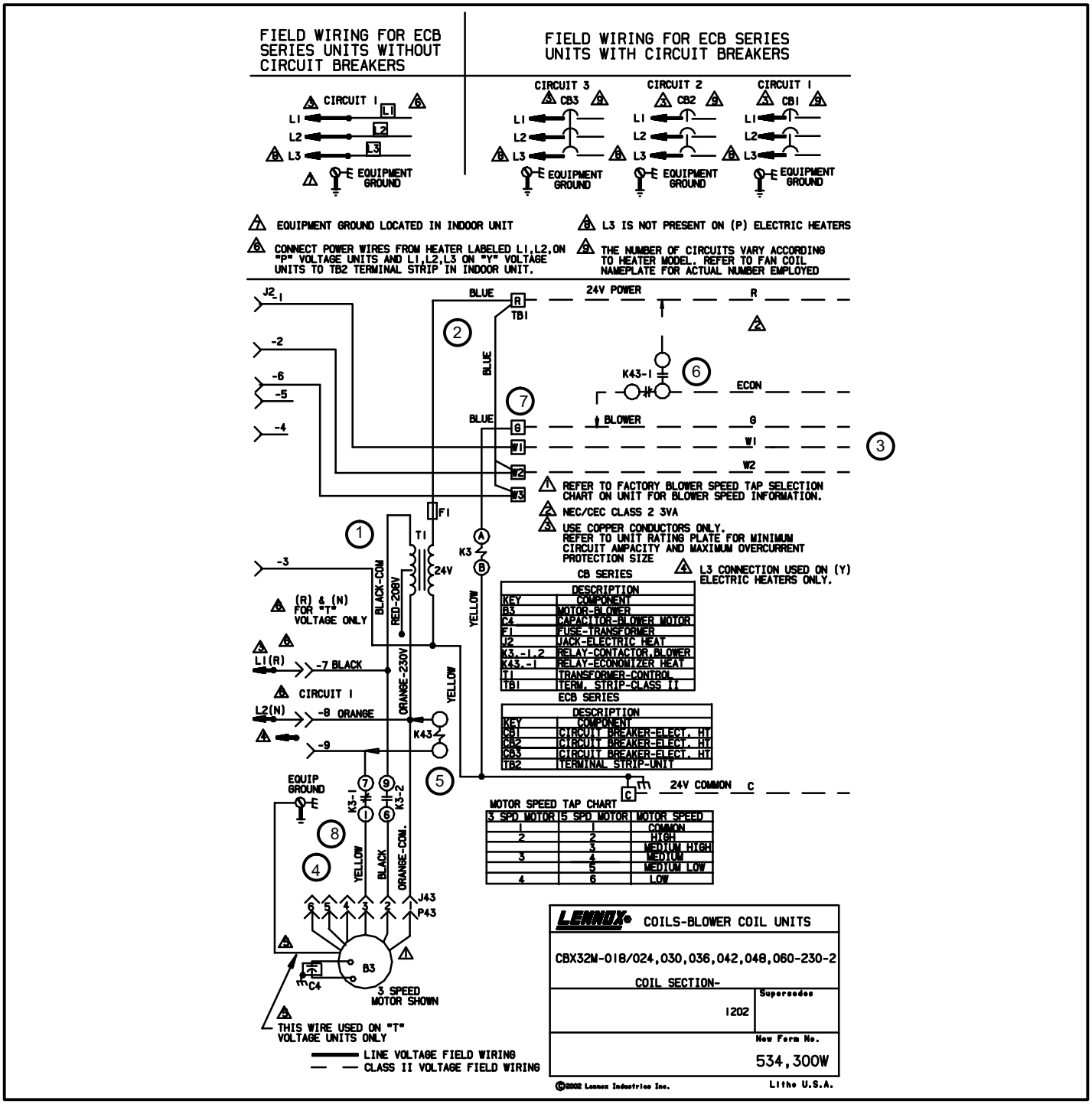
B-Supply Air Blower

1- Check and clean blower wheel.
2- Motors are prelubricated for extended life; no further lubrication is required.

C-Electrical

1- Check all wiring for loose connections.
2- Check circuit breaker located in unit control box.
3- Check for correct voltage at unit (unit operating).
4- Check amp-draw on blower motor.
5- Check to see that heat (if applicable) is operating.

VIII-WIRING DIAGRAMS AND SEQUENCE OF OPERATIONS



A-CBX32M - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

1- Line voltage is routed to transformer T1 and blower motor B3.

2- T1 supplies 24VAC to terminal strip TB1, which supplies 24VAC to the indoor thermostat and electric heat, if used.

HEATING

3- When there is a call for heat, W1 of the thermostat energizes the electric heat relay K32 (covered in the electric heat section).

4- Blower motor B3 is energized on heating speed after K32-1 closes (see electric heat).

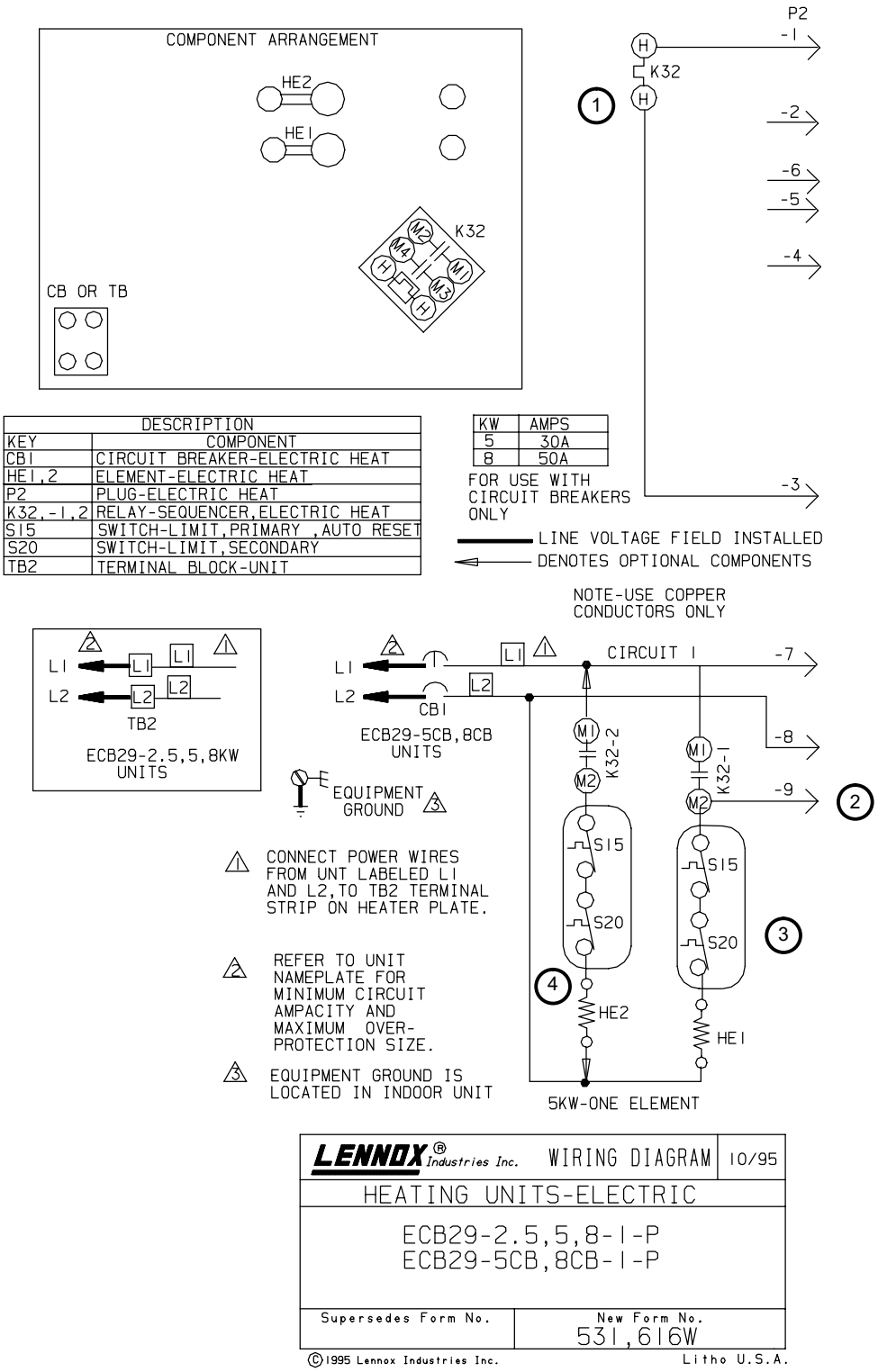
5- Economizer relay K43 (if used) is energized after K32-1 closes (see electric heat section).

6- K43-1 closes energizing the economizer with 24VAC.

COOLING

7- When there is a call for cooling, G of the thermostat energizes blower relay K3 and the economizer, if used.

8- K3-2 closes energizing blower motor B3 on cooling speed.



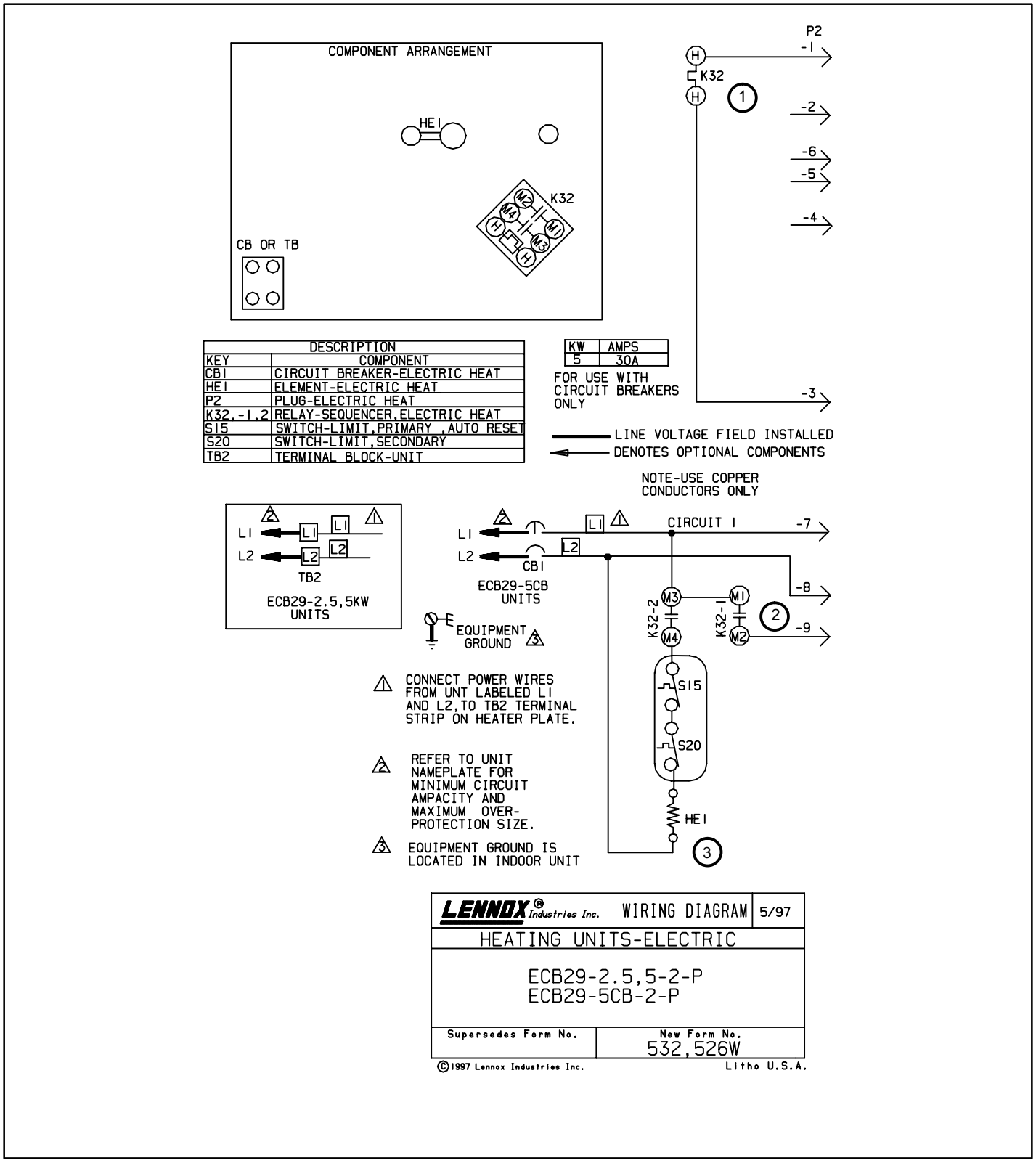
B-ECB29-2.5, -5, -5CB, -8, -8CB - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

1- When there is a call for heat, W1 of the thermostat energizes the electric heat relay K32 with 24VAC.

2- When K32-1 closes, the blower is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).

3- Assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.

4- When K32-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE2 is energized.

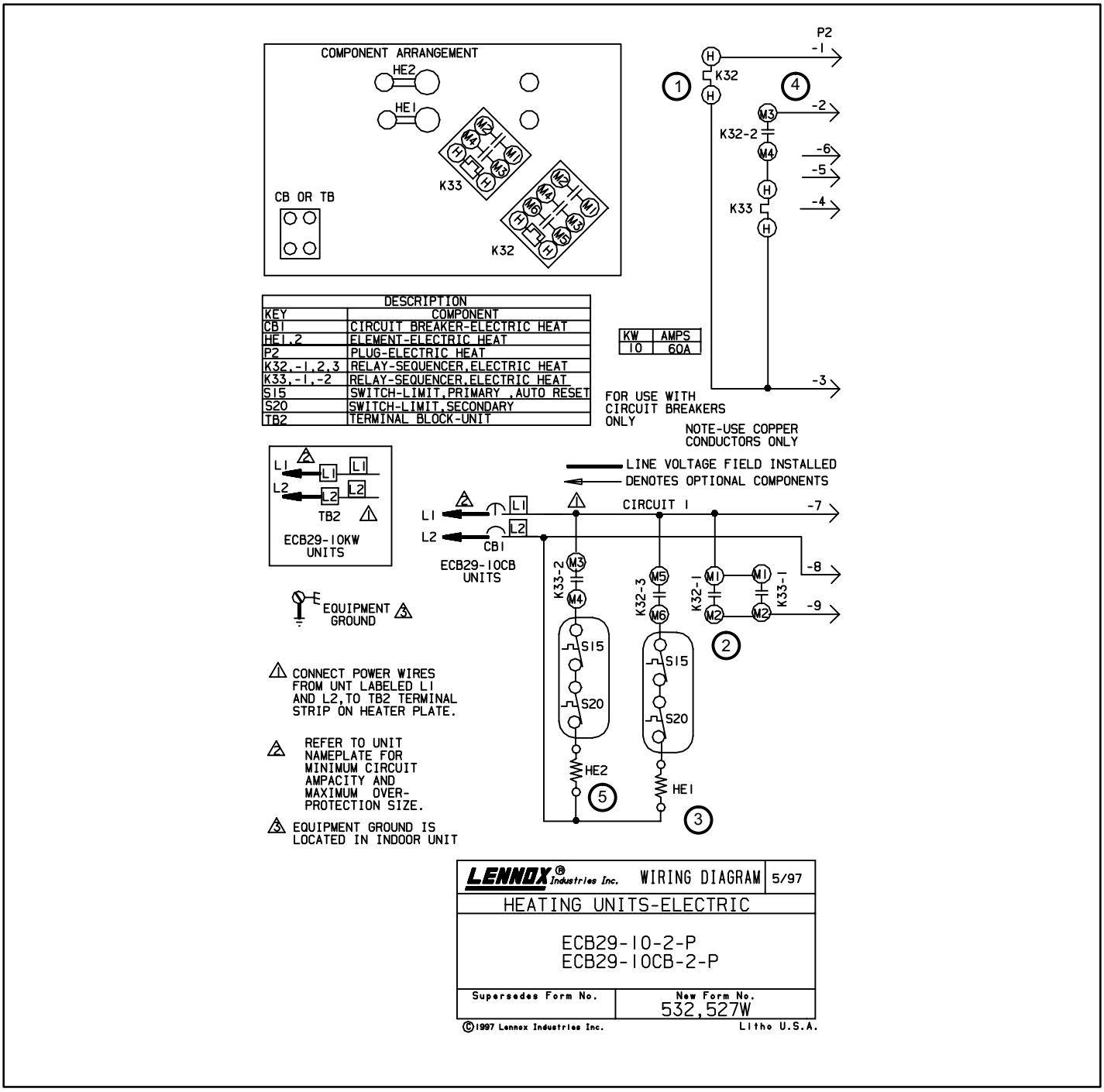


C-ECB29-2.5, -5, -5CB, 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

1- When there is a call for heat, W1 of the thermostat energizes the electric heat relay K32 with 24VAC.

2- When K32-1 closes, the blower is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).

3- When K32-2 closes, assuming N.C. primary (S15) and the secondary (S20) limit switches are closed, electric heat element HE1 is energized.



D-ECB29-10, -10CB - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

FIRST STAGE HEAT

1- When there is a call for heat, W1 of the thermostat energizes the electric heat relay K32 with 24VAC.

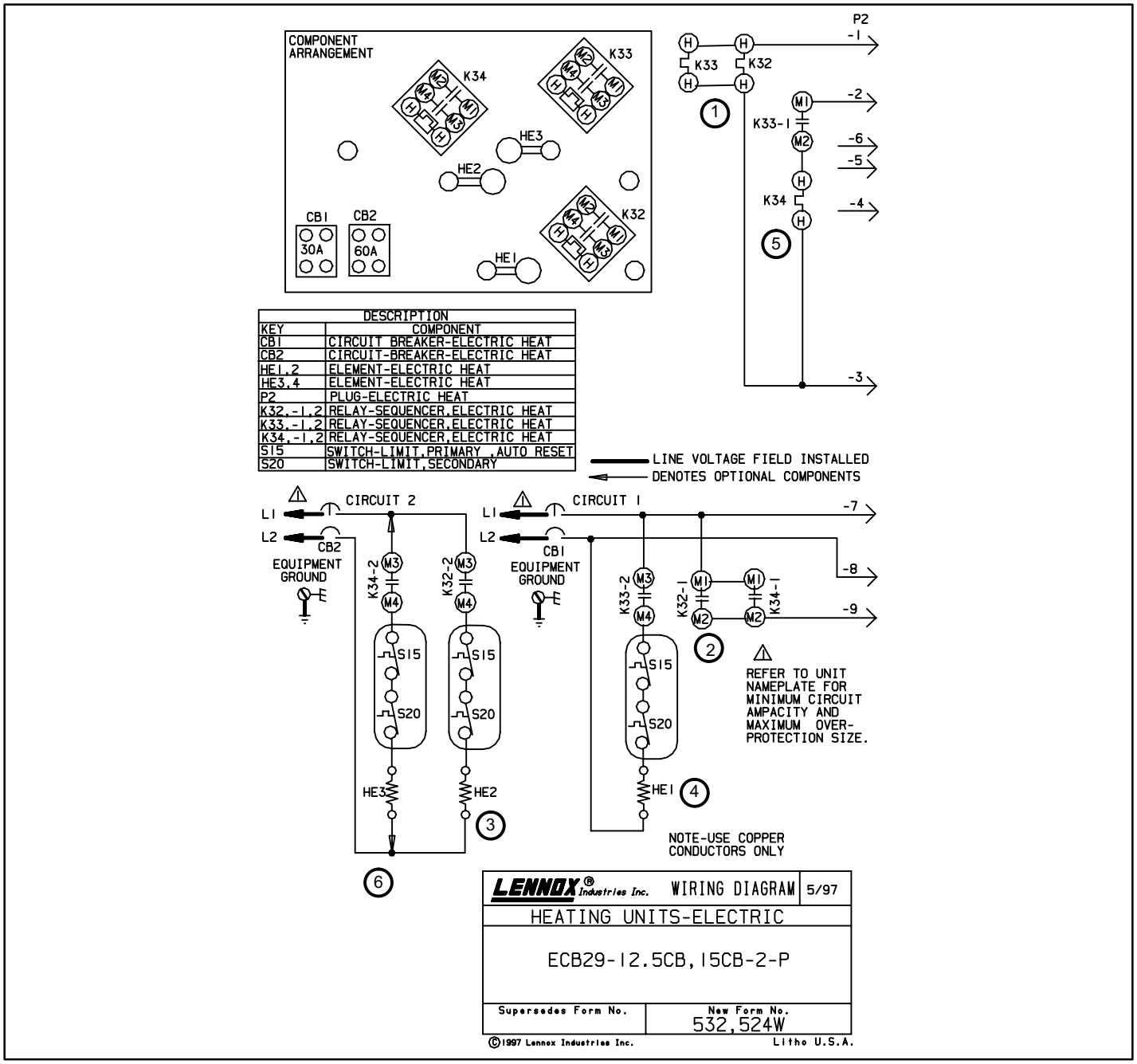
2- When K32-1 closes, the blower is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).

3- K32-3 closes and assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.

SECOND STAGE HEAT
(remove jumper between W2 and R)

4- When K32-2 closes, the unit is ready for a second stage heat demand. W2 of the thermostat sends a second stage heat demand, energizing the electric heat relay K33 with 24VAC.

5- When K33-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE2 is energized. K33-1 closes until second sage heat demand is satisfied.



E-ECB29-12.5CB, -15CB - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

FIRST STAGE HEAT

1- When there is a call for heat, W1 of the thermostat energizes electric heat relays K32 and K33 with 24VAC.

2- When K32-1 closes, the blower is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).

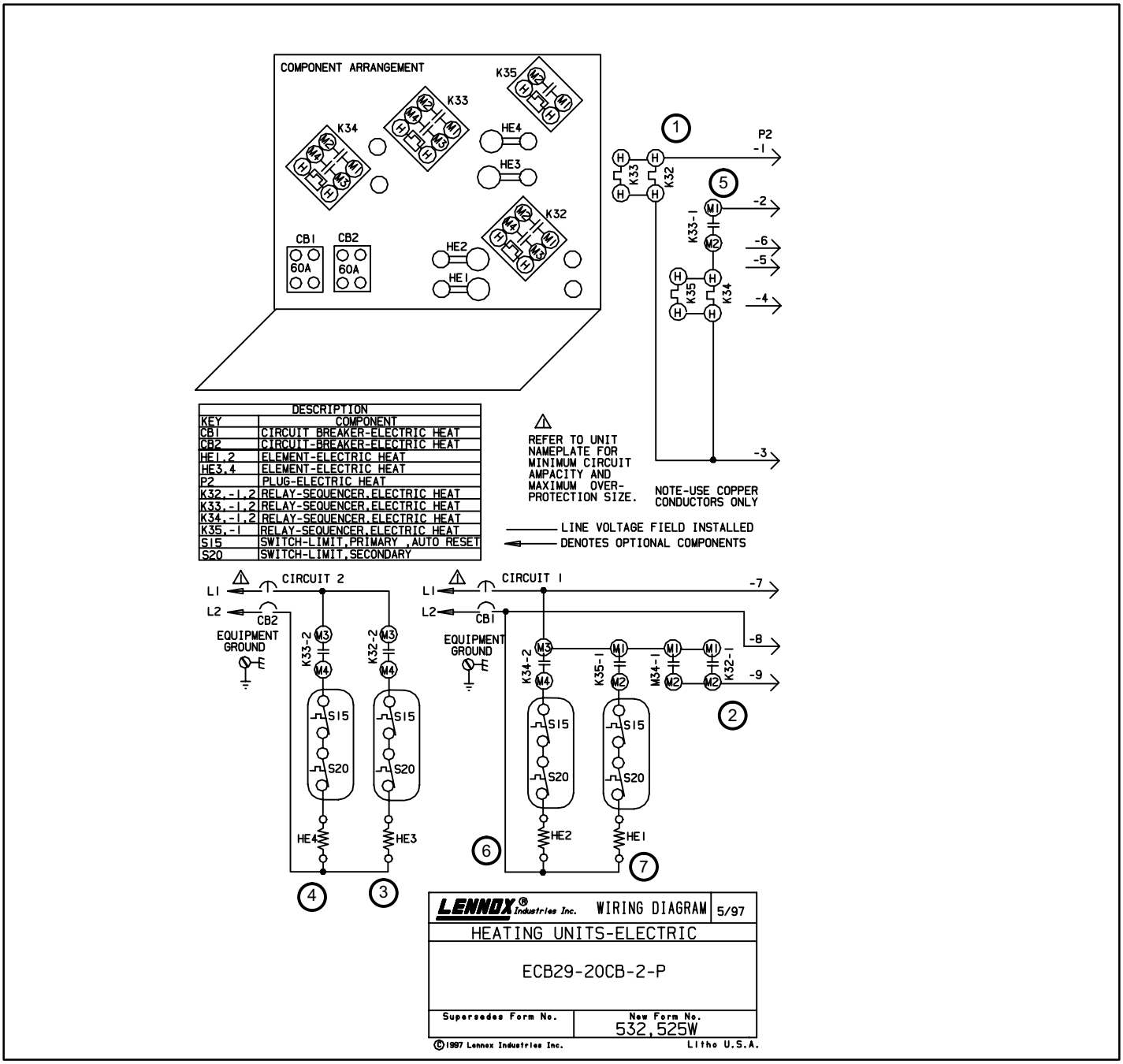
3- When K32-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE2 is energized.

SECOND STAGE HEAT
(remove jumper between W2 and R)

4- When K33-1 closes, the unit is ready for a second stage heat demand. When K33-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.

5- W2 of the thermostat sends a second stage heat demand, energizing electric heat realy K34 with 24VAC.

6- When K34-1 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, heating element HE3 is energized. K34-1 closes until second stage demand is satisfied.



F-ECB29-20CB - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

FIRST STAGE HEAT

1- When there is a call for heat, W1 of the thermostat energizes electric heat relays K32 and K33 with 24VAC.

2- When K32-1 closes, the blower is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).

3- When K32-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE3 is energized.

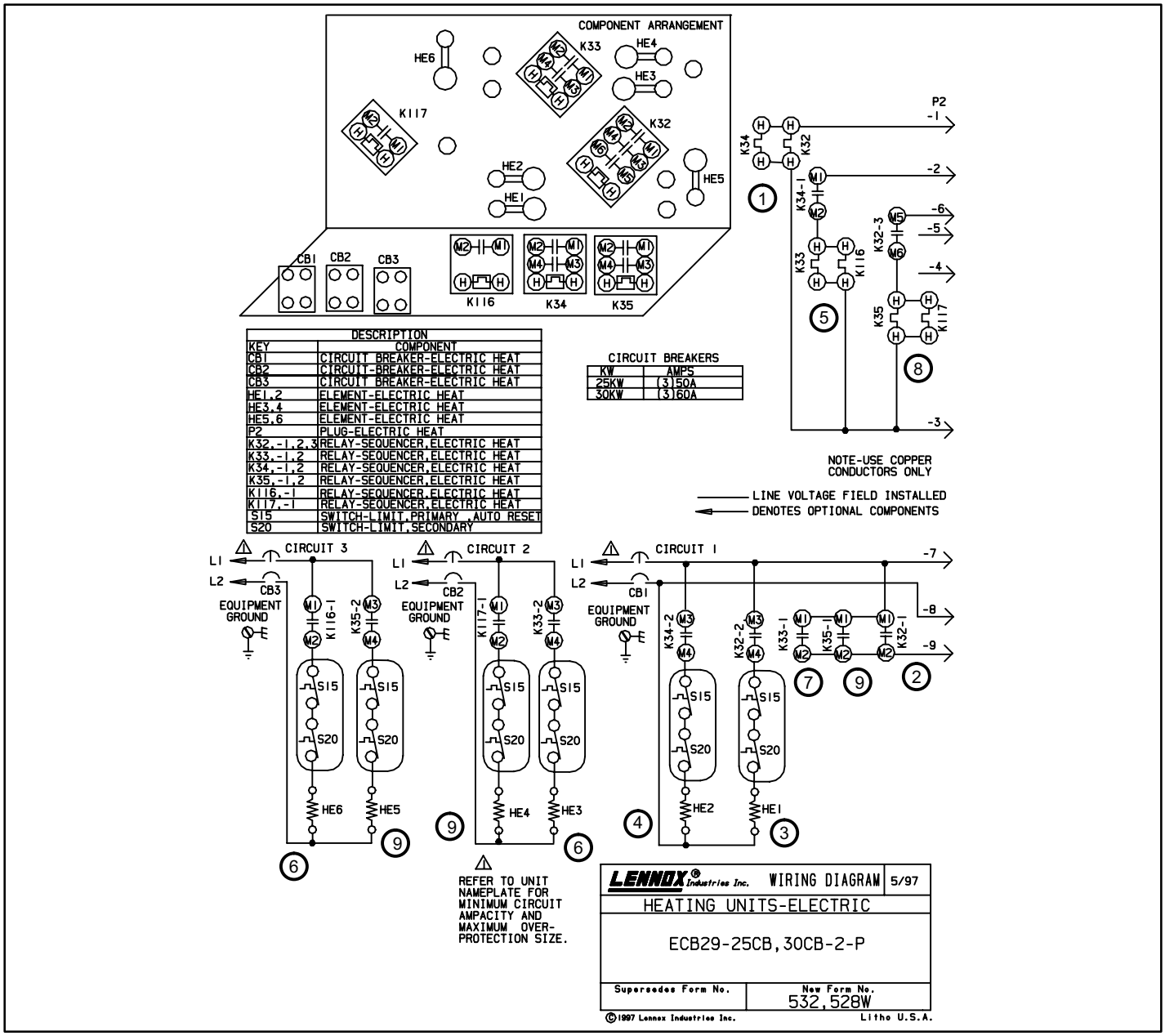
4- When K33-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE4 is energized.

SECOND STAGE HEAT
(remove jumper between W2 and R)

5- When K33-1 closes, the unit is ready for a second stage heat demand. W2 of the thermostat sends a second stage heat demand, energizing the electric heat relays K34 and K35 with 24VAC.

6- When K34-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, heating element HE2 is energized. K34-1 closes until second stage heat demand is satified.

7- When K35-1 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.



G-ECB29-25CB, -30CB - 208/230V SINGLE PHASE - SEQUENCE OF OPERATION

FIRST STAGE HEAT

1- When there is a call for heat, W1 of the thermostat energizes the electric heat relays K32 and K34 with 24VAC.

2- When K32-1 closes, the blower is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).

3- When K32-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE1 is energized.

4- When K34-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE2 is energized.

SECOND STAGE HEAT

(remove jumper between W2 and R)

5- When K34-1 closes, the unit is ready for a second stage heat demand. W2 of the thermostat sends a second stage heat demand, energizing the electric heat relays K33 and K116 with 24VAC.

6- When K33-2 and K16-1close, assuming primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE3 and HE6 are energized.

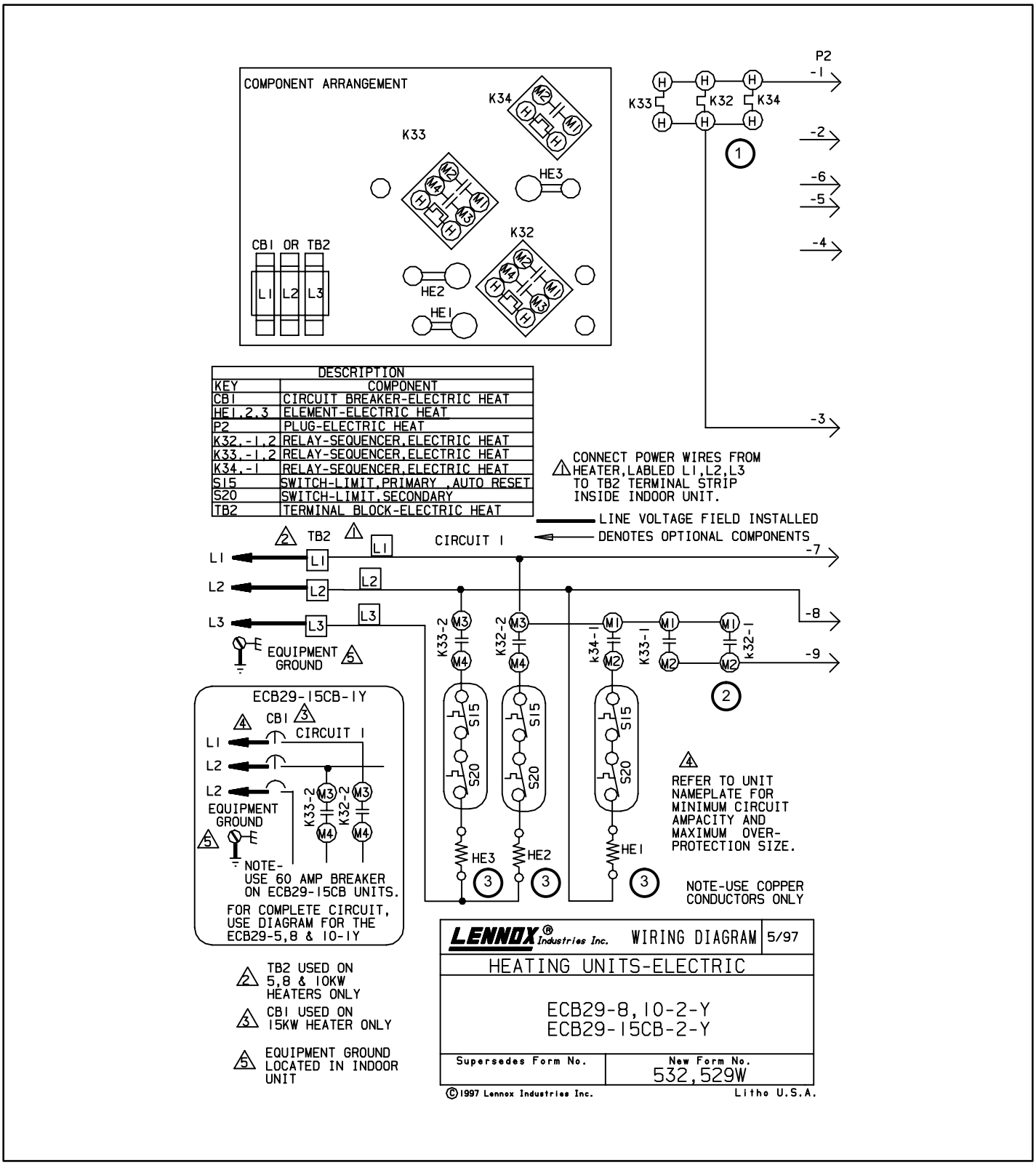
7- K33-1 closes and remains closed until second stage heat demand is satisfied.

THIRD STAGE HEAT

(remove jumper between W3 and R, if using third stage)

8- When K32-3 closes, the unit is ready for a third stage heat demand. W3, if available, of the thermostat sends a third stage heat demand, energizing the electric heat relays K35 and K117 with 24VAC.

9- When K35-2 and K117-1 close, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE4 and HE5 are energized. K35-1 closes until third stage heat demand is satisfied.

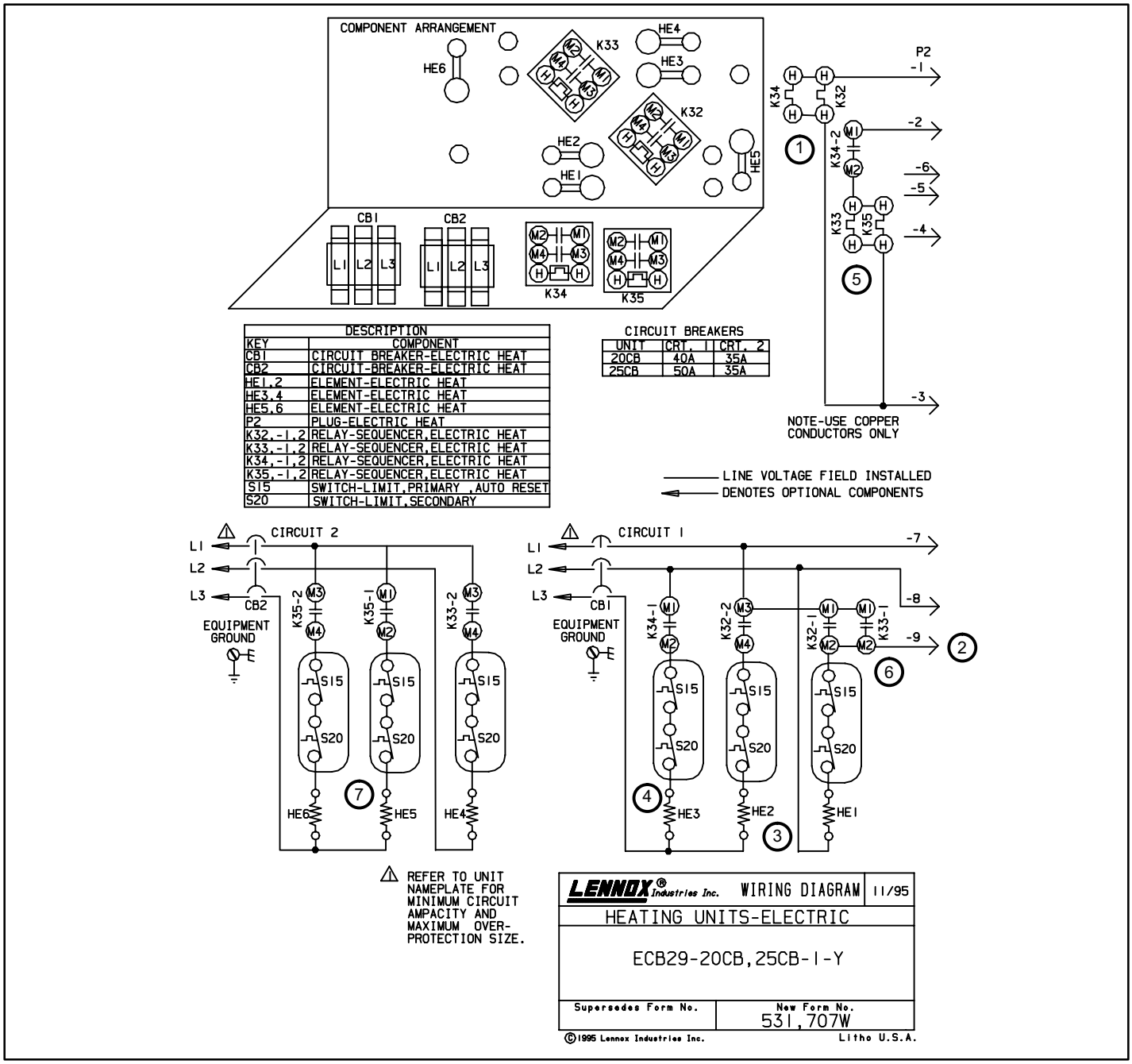


H-ECB29-5, -8, -10, -15CB - 208/230V THREE PHASE - SEQUENCE OF OPERATION

1- When there is a call for heat, W1 of the thermostat energizes the electric heat relays K32, K33 and K34 with 24VAC.

2- When K32-1 and/or K33-1 closes, the blower is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).

3- When K32-2, K33-2 and K34-1 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE1, HE2, and HE3 are energized.



DESCRIPTION	
KEY	COMPONENT
CB1	CIRCUIT BREAKER-ELECTRIC HEAT
CB2	CIRCUIT-BREAKER-ELECTRIC HEAT
HE1,2	ELEMENT-ELECTRIC HEAT
HE3,4	ELEMENT-ELECTRIC HEAT
HE5,6	ELEMENT-ELECTRIC HEAT
P2	PLUG-ELECTRIC HEAT
K32,-1,2	RELAY-SEQUENCER,ELECTRIC HEAT
K33,-1,2	RELAY-SEQUENCER,ELECTRIC HEAT
K34,-1,2	RELAY-SEQUENCER,ELECTRIC HEAT
K35,-1,2	RELAY-SEQUENCER,ELECTRIC HEAT
S15	SWITCH-LIMIT,PRIMARY ,AUTO RESET
S20	SWITCH-LIMIT,SECONDARY

CIRCUIT BREAKERS		
UNIT	CRT. 1	CRT. 2
20CB	40A	35A
25CB	50A	35A

I-ECB29-20CB, -25CB - 208/230V THREE PHASE - SEQUENCE OF OPERATION

FIRST STAGE HEAT

1- When there is a call for heat, W1 of the thermostat energizes the electric heat relays K32 and K34 with 24VAC.

2- When K32-1 closes, the blower is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).

3- When K32-1 and K32-2 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE1 and HE2 are energized.

4- When K34-1 closes, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat element HE3 is energized.

SECOND STAGE HEAT
(remove jumper between W2 and R)

5- When K34-2 closes, the unit is ready for a second stage heat demand. W2 of the thermostat sends a second stage heat demand, energizing the electric heat relays K33 and K35 with 24VAC.

6- When K33-1 closes, the blower (if not energized) is energized on heating speed and economizer heat relay K43 is energized (see 208/230VAC CB schematic).

7- When K33-1, K35-1, and K35-2 contacts close, assuming the N.C. primary (S15) and secondary (S20) limit switches are closed, electric heat elements HE4, HE5, and HE6 are energized.